SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

BIRMINGHAM, AND THE BLACK COUNTRY.

THE INTENDED VISIT OF THE IRON AND STEEL INSTITUTE TO STAFFORDSHIRE.

Those members of the Iron and Steel Institute interested in mining matters will, after inspecting the works of the New British Iron Company, have an opportunity of seeing two of the finest colliery plants in the neighbourhood, which are not far distant. They are the New Hawne Pits, belonging to the above company, and the Homer Hill Pits, the property of Messrs. Swindell. The New Hawne Pits are sunk down to the "Thick coal," which is lying so near the southern extremities of the coal field that it is much contorted, and in some places very inferior. The two shafts are each 8½ ft. in diameter, by 270 yards deep, and are lined in the ordinary way with brickwork. An extensive rock parting lies in the centre of the bed of coal; in the southern portion of the workings it is only 6 ft. thick, but over 400 yards from the pit bottom, to the north, it increases in thickness to 30 ft. The portion of the coal above the rock is about 13 ft. thick, and that below 12 ft.; and the workings are upon the long wall system, and in the top of the seam. This is not the usual method of working Thick coal in South Staffordshire, for it is got by the rib and pillar mode, which is not so very economical, as beside the waste made in getting it, in some instances 6 ft. of the best of the seam is left as a roof, and the ribs and pillars, after standing for a time, are not entirely cleared out. The winding is done at the Hawne Pits by two high-pressure horizontal engines coupled together, having 24-in. cylinders, working a 4-ft. stroke. The drum is placed between the cranks upon the crank shaft, and is 12 ft. in diameter; it is composed of cast-iron rings and wood laggins; the break-wheel is in the centre, and by its weight partly answers as a fly-wheel. The engine-driver is seated upon an elevation between the two cylinders, so that he can see the pit tops without his vision being intercepted by the drum. The steam is generated in four cylindrical egg-ended boilers. Round wire-ropes are used, and each one is attached to a cage carrying one tub, and running in two wire-rope guides.

Underneath the floor of the winding engine-house there is a pumping-engine, with a 20-in. cylinder and a 4½-ft. stroke; it is geared off to the pump, which travels a 6-ft. stroke, and is 8½ in. diameter. The trees go down a distance of 60 yards, to a strong feeder of water that was met with in sinking, and has not diminished in the supply of water since. A small engine is sometimes employed for raising or lowering men into the water pit, to repair the pumps, or change the buckets. Great attention is paid here to the screening of the coal, and the apparatus employed is the most complete—so much so that the material, although brought up out of the pits in a mixed state, lumps, slack, and bats altogether, without hardly being touched by hand, is sorted and loaded into trucks. In the centre of the apparatus there are two revolving screens, one inside the other, and so geared as to work in opposite directions. On either side of these there is an ordinary flat screen, having at its top an arrangement by which the tub coming from the pit is upset and again righted, the contents passing down the screen, the small falling through the bars of the screen, which are set rather far apart, and the lumps rolling into a hopper at the bottom. That portion which has fallen through the screen is picked up by buckets, fastened to an endless strap, and thrown into the interior of the revolving screens; the nuts roll straight through, the small bright pieces fall out from between the two screens, and the fine slack passes through the outer screen. Boys are placed at the openings of the hoppers, and nearly the whole of the stuff goes through their legs, so that the bats are picked out, the good sorted into four varieties, and can be loaded into wagons or trucks, which are brought by the locomotives under the hoppers. Motion is given to the screens by shafting connected to the pumping engine. Over 150 men and boys are engaged in these pits, and there are 35 horses. The draught of coal is about 400 tons per day, and there is nearly four miles of gate-roading.

The Homer Hill Colliery, the property of Messrs. Swindell, is situated at Cradely, and there is machinery capable of raising 600 tons of coal per day. There are two vertical winding-engines coupled together, with the drum between them, supported upon cast-iron columns and girders, built into the engine-house walls. They are larger than those of the Hawne Colliery, and, therefore, more above their work, so that the journey of over 200 yards can be run in about 10 seconds. A steam-brake is attached to the indicator, so that it is next to impossible to over-wind the cage; the same brake is also worked with levers by the foot of the driver. Round wire-ropes are used, and a cage in each shaft travels in wood conductors. In this colliery there are about 90 acres of Thick coal to be got, but as it borders on the southern extremity of the coal field, as we before stated, it is very much cut up by faults. This will be understood when it is stated that in starting from a downthrow, where the bottom coal is brought level with the top, for 380 yards it runs in an upward direction, when there is another downthrow of 31 yards, then at a distance of 300 yards further an upthrow of 15 yards, followed by a series of smaller faults. The irregular state of the strata renders the ventilation very difficult, as the downcast shaft is sunk to a depth of 202 yards, for getting the lowest portions of the coal between the two larger faults, and the upcast shaft is sunk only 165 yards to the upper portion of the coal.

A "jackey" pit, 19 yards deep, and an inclined road connect the upper and lower portions of the seam, and these the air has to traverse on its way from the lower workings to the upcast-shaft. This state of things rendered it necessary to provide mechanical ventilation, and a Guibal fan is erected, and driven by a high-pressure horizontal engine, with 10-in. cylinder and a 16-in. stroke, working direct-acting. The ventilator consists of an outer casing of brickwork 14 in. thick, made for about two-thirds of the circumference concentric with the fan, the remaining portion being eccentric with a larger radius, so as to enlarge the casing gradually towards the point of discharge. The side of the chimney forming the continuation of the bottom of the casing, or the eccentric part, inclines outward, thus gradually increasing the sectional area of the passage or stack towards the top. The sides of the fan-casing are of brickwork 20 in. thick, having a circular opening 6 ft. 7 in. diameter in the centre of the side near the pit for admitting the air into the fan. This opening is connected with a drift 43 ft. long, and having 35½ ft. sectional area, inclining towards the upcast-shaft. The centre framing of the fan consists of two cast-iron octagonal centres 4 feet 7 inches diameter, and on each of the eight sides of these castings is bolted a wrought-iron arm, made of a flat bar 3½ in. by ¾ in.; these arms are bolted together where they cross each other, so as to form a strong and light frame. The eight vanes of the fan are made of 1¼-in. deal, bolted to angle-irons that are riveted upon the wrought-iron arms; the vanes are each 4 ft. 9 in. wide, and 5 ft. 7 in. long, giving an area of 26 ft., and they work with 1 in. clearance at each edge from the side walls, and 2 in. clearance from the circumference. Each vane is inclined backwards through the inner half of its length at an angle of 45° from the radial direction; and the outer half is curved forwards to the extent of 10 in. at the end. The inner ends of the vanes extend to 3 ft. 2 in. distance from the centre, the clear space in the centre being about ⅔ of the diameter of the fan. The outer end of the fan-shaft works in a carriage, fixed to a girder crossing the opening from the drift, and the inner end in a carriage on the engine-bed. When the fan is running at its usual working speed of 26 revolutions per minute, the outer ends of the vanes move at the speed of 1350 ft. a minute, but the speed of the engine piston at the same time is only 70 ft. per minute.

An adjustable sliding shutter, made of deal boards, bolted to flexible strips of hoop-iron, is made to slide in cast-iron grooves over the opening from the fan to the stack. It is so constructed that it deports itself to the circle of the opening, and can be raised or lowered by means of a chain passing over a pulley near the top of the stack, having at its other end a balance weight. This adjustable shutter is used in varying conditions of the underground workings for securing the most effective results from the fan, by altering from time to time the area of the discharge-opening in accordance with the quantity of air to be discharged at the time. The opening of the outlet chimney is 3 ft. 3 in. by 4 ft. 11 in. at the bottom, and increases to 6 ft. by 4 ft. 11 in. at the top, giving an area of discharge of 29·4 ft. The height of the chimney from the bottom of the fan is 32 ft. In applying this fan an arrangement was necessary for closing the mouth of the shaft, so that the ventilator might not draw the air from the top instead of from the workings. This was accomplished by placing a wood movable cover over the pit top, consisting of a square box, surmounted by a pointed roof, with a hole left in the centre through which the winding-rope works. The cover has two balance weights attached to it by chains passing over the conductor framing, and thus its weight is taken off the rope when it is lifted by the cage to allow of the tubs being drawn off and on. The hole in the top of the cover through which the rope passes is covered by a loose piece of wood, having in it a hole just sufficiently large for the rope to run through. This piece of wood moves freely with the rope when it oscillates, sliding about on the hole in the cover without uncovering it. The fan at its usual working speed—26 revolutions per minute—passes 13,600 cubic feet of air, but at its top speed, 96 revolutions, it will draw 51,700 cubic feet per minute. When the cage is at the top of the upcast shaft, and the cover is off, 7-16ths of the air going into the fan comes from the top, but, considering everything, the loss occasioned by this is only about 1-20th of the whole work of the fan. We have particularly described this fan, as it has been found to answer so admirably in this place, so difficult to ventilate, and its power is beyond any emergency. It is about the only apparatus of the kind at work in the district.

THE COLLIERY INSURANCE COMPANY.

Sir,—The subject of accidents in mines, which has of late so painfully agitated the public mind, is, at the same time, a source of considerable uneasiness to the proprietors of mines, not only as regards the destruction of their property, but the continued sacrifice of the lives of the labourers employed in the mines. It is with no small degree of satisfaction that I see heralded the advent of an insurance company which embraces a new and hitherto untrodden field of insurance operations—that of insuring the proprietors of mines from losses occasioned by the explosion of mines, by fire, and also the lives of the miners employed in the underground works, thus making a provision for their widows and orphans. The latter provision is undoubtedly one of the highest importance, and will recommend itself to all who are interested in the welfare of that extensive class who labour to extract from the bowels of the earth fuel and other valuable substances for the use and benefit of the general community.

It appears by a return of the Government Inspectors of Mines that there are upwards of 3000 collieries in Great Britain, and that on an average accidents happen to one-third annually, and that the men who labour in the mines number more than 300,000, of whom 1000 perish annually, but neither the property of the owners nor the lives of the workmen have hitherto been protected under any system of insurance, although it is a well established fact that where an average of life is ascertainable, all property, as well as those who are engaged in the property whose lives are jeopardised by working the same, are fair and legitimate subjects for insurance.

Insurance, whether of life or fire, is a system conducing actively to the welfare of humanity; it is a system adapted to the circumstances of all grades and classes, and all ages and sexes; a system which in its several ramifications embraces and effects with a completeness otherwise unattainable every one of the objects of prudential economy. There is an axiom in life and fire insurance that "the greater the risk the greater the profit;" that simply means the wider an insurance company extends the area of its operations the less will be the loss, and by consequence the greater will be the profit.

If the Colliery Insurance Company carry out their plan to the extent to which it is capable of being carried out it will very materially tend to lessen, if it does not entirely extinguish, those baneful burial and other kindred societies which often end in insolvency, involving moral misery amongst the working population of the country. The amount of loss which their insolvency inflicts on the industrious and frugal of the productive classes may be reckoned by thousands. Of all the discouragement to habits of prudence, frugality, and industry, not one is endowed with more baneful effects than the spectacle of men deprived of the fair reward of those habits. Disappointments in this way, so continually the result of connection with "broken clubs," have too often changed the sober and careful artizan into a dissolute drunkard.

I purposely abstain from going into arithmetical or statistical calculations as to the amount of revenue which will be the result of the company's operations; suffice it to say that the smallest estimate would be sufficient to justify the necessity and importance of this kind of insurance. The system is now forming part of the people's education, and one of the avowed wishes of economists and philanthropists is that the system of insurance instead of being exceptional should be rendered universal. —— S. H.

DENUDATION OF THE COALBROOKDALE COAL FIELD.

Sir,—Mr. Jones informs you that he was not a little astonished at reading my letter in the Supplement to the Journal of the previous week. He could not have been more surprised than I was on reading his exposition of my views, or than I still am at his persistency now that I have given him an opportunity of setting himself right. I reciprocate the sentiment contained in a friendly suggestion from a brother geologist—still it would be wrong to allow my views to be misinterpreted without an effort to set myself right. Mr. Jones in the article I complain of says—"I have taken some trouble in ascertaining whether the denudation took place before or after the dislocations." Then, "from data derived from Mr. Scott and Mr. Parton," he says "it appeared quite certain that denudation took place long before the dislocations"—adding, in a foot-note, "I find my views at variance with those of Mr. Randall."

By "the dislocations" I understand Mr. Jones to mean the faults of the coal field as figured by Mr. Prestwich, Mr. Scott, and Mr. Parton, and as known to practical men. I have always held, and have repeatedly stated in the hearing of Mr. Jones and otherwise, that the causes operating to produce these dislocations were of a subsequent occurrence. Others have heard these statements, and read them in the articles on the Denudation of the Coalbrookdale Coal Field; but I venture to say no one who has done so has arrived at the conclusion Mr. Jones has drawn. Had they done so the absurdity of the thing would have struck anyone at once, because it really amounts to this—that I believed that 1000 ft. of strata, more or less, over hundreds of square miles, had been acted upon by a body of water, that they had been gradually worn down and carried away after they had been covered over by from 1000 to 10,000 ft. of other strata, because everybody knows that these dislocations affect the overlying Permians, and must, therefore, have been subsequent to their formation. Such a monstrous conclusion could not have escaped detection from Mr. Jones, gifted as he is with a keen scent in hunting up heterodoxy in geological opinions, even if it had not been noticed by less observant readers. But what I complain of most is, that Mr. Jones should select a passage having a *local application* in one out of twenty letters, and put if forth as representing my views on the general subject, and also that he should persist in this, notwithstanding the language used in the passage quoted is sufficient of itself to refute him, as I pointed out in my letter of July 29. I explained what I meant in my sixteenth letter, in which I said:—

"Sir,—In writing to a contemporary, Mr. Parton quotes a passage from a former letter of mine, in the *Mining Journal*, in which I supposed certain coal tracts within what appears to have been the estuary of denudation to have been saved from destruction by faults of depression, and asks whether others might not have been saved in a similar way. The writer will find that I admitted as much in the article he quotes from. I also made similar admissions in the paper Mr. W. W. Smyth, M.A., F.G.S., was kind enough to read for me before the British Association, at Exeter.

In assuming that the tracts in question were so saved, I availed myself of the benefit of a doubt as to the period of certain disturbances, the result of volcanic action in the neighbourhood, rather than of the supposition that the singular prolongation of the coal measures in question formed a tongue or headland stretching out into the estuary, which is the only other alternative, in case it can be shown that it was not let down below the level at which others further off were affected. The writer adds, 'These facts suggest the question, will not the faults which throw in the Permian, and more especially the Bunter series of the New Red, near Kemberton, at Shifnal, Woodcote, &c., have so depressed the coal series—or, to speak more correctly, the coal series lie at such a depth as to be far out of the reach of the wasting effects of denudation?' Here Mr. Parton must pardon me if I say he compares two things very dissimilar. He has evidently written in haste, and has not thought over what he had written. It is like confounding the dissolution of Monasteries in the reign of Henry VIII. with the disestablishment of the Irish Church in the reign of Victoria. I had supposed, from certain indications of igneous action in and on the borders of the Shropshire coal field, that a small patch of coal measures had been saved from denudation in previous depressions; but the faults the writer of the article refers to must have taken place not only after the Permians had been formed, but after they had in turn been denuded, and the Bunter deposited upon their wasted, water-worn, and unconformable sides. Mr. Parton must see, upon consideration, that such movements as he mentions were ages upon ages posterior to any which could have removed any portion of the coal measures out of reach of the waters of the estuary referred to, and that there is, therefore, no parallel in the case."

I am not going to insist, in the face of evidence to the contrary, that this small batch of coal measures were so saved—they might possibly have formed a headland or tongue, stretching out into the estuary; but I do protest against my theory, in accounting for these coals being left in the pits I mentioned, being construed to mean the whole of the coal field where denudation is apparent. Mr. Jones does not, surely, deny that there had been differences of level from some cause prior, as well as subsequent, to the period of denudation—otherwise, how will he account for the fact of denudation at all? If there were no changes of level, how will he account for the fact that after one tolerable uniform surface had been maintained during the formation of the coal measures one portion became subject to the ravages of the waves, and the other not; and why were 1000 ft. of coal measures cut down and carried away in one place, whilst they were spared in another? These disturbances and changes of level, it is true, were greatest to the south and south-west—so great that they led to the entire destruction of the coal measures over very wide areas.

In my eighth letter on the South Staffordshire and Shropshire Coal Fields, headed "How and When were they Denuded," I said, whilst pointing out evidences of denudation in South Staffordshire, that "from 500 to nearly 1000 ft. of upper coal strata had been cut down and destroyed before the deposition of the red rocks commenced, pebbles of coal and of coal measure Sandstone having been found at the bottom of shafts on passing from the Permians into the carboniferous series of rocks, thus silently attesting the agency by which they suffered.

It is quite certain not only from these, but from other facts, that somewhere about this period the coal measures were materially pared down and eroded, that—to use the word denuded in its true and literal sense—old surfaces were stripped and laid bare, the bulk of their covering being removed and thrown down at a distance, where they formed those worthless seams which have tempted many to believe they were the legitimate coal measures; and such changes require us to believe, undoubtedly, that equally long periods of time were consumed during these taking down and wasting processes as were previously required for building up."

It will be a sufficient refutation of the errors Mr. Jones has fallen

into to refer to the summing up of my views, as they appear in the first paragraph of my twentieth letter.

As to whether the Permians do or do not come up and overlap the older coal measures, without the intervention of any of the members of the younger group, depends upon how the red marls and red and grey rocks are classified, which lie between the Permians on the surface and the coal measures underneath: that the Permians overlap the older coal measures with or without the new is certain, and that they increase in thickness as they recede from them in the direction of the estuary is certain. J. RANDALL, F.G.S.

Madeley, Salop, Aug. 7.

PNEUMATIC STAMPS.

SIR,—Reference was some time since made in the *Mining Journal* to an improved stamps manufactured by Messrs. Harvey and Co., of Hayle, and invented, I believe, by Mr. Husband, but I have not seen any further notice of it, and should, therefore, be glad to know whether it has been adopted at all in Cornwall, and, if so, where? When I saw it at work at Nine Elms nothing could surpass the smoothness with which it run, but I should like to see the effect of a whole battery of (say) 20 heads, and especially if applied to dry stamping, which I believe will hereafter be the only kind of stamping used when fineness is desirable. It would prove more cleanly, more economic, and more convenient, and I have seen no stamp better adapted to it than Husband's, but, of course, some little difference would have to be made in the arrangement of the framing and other parts.

Dry stamping should always be conducted in closed chambers, and arrangements should be made for removing the fine particles as fast as they are produced. This was done in Child's stamp by attaching a fan behind the head, so as to draw the dust from under the head, and propel it into a suitable room or chamber. I believe it was this arrangement that caused Child's stamp to give such excellent results, and it is easily understood that it would be so, for the stamp would never be doing its work twice over. With the present arrangement much of the force of the blow is lost, from the hard ore being crushed upon a partially soft bed—that is, the hard ore is supported by that already stamped With dry stamping and Child's fan this would be impossible; the fine ore would be at once drawn off, and every blow would have its full effect upon a fresh portion of ore. If Mr. Husband's stamp be in use it might be worth while to give it a trial with a fan, and without water. ENQUIRER.

ON THE DRESSING OF ORES—No. XI.

CONTINUOUS JIGGING MACHINES.

SIR,—The separation of substances of different densities by means of jigging is founded on the fact that if two bodies of equal volume and of distinct specific gravity be dropped at the same instant and from the same point into a column of water the one of greater weight will leave the other, and arrive at the bottom first.

In ordinary jigging-machines the length of the water column is represented by a given number of strokes, each one of the latter projecting the bodies a given height, ultimately bringing grains of like volume and density together. In non-continuous jiggers, light and worthless particles are removed by means of a "limp," but in continuous machines "waste" as well as the orey product are collected by the combined action of pistons and a stream of water. In this case the jigging or separating movement is not a vertical but an inclined line, the base of the angle representing the influence of the stream.

The jigging-sieve has long been an almost indispensable appliance on the dressing-floors. Agricola gives several representations of those used in the Saxon Erzgeberge in 1600-1620, whilst illustrations are frequent enough in the works of various German and French writers of more recent date. In October, 1830, Thomas Petherick took out his first patent for an "ore separator," and used the machine with great advantage at the Lanescot Mines, near St. Blazey, Cornwall. The Germans, with some modification of detail, appear to have adopted Petherick's apparatus, and subsequently engrafted on it one of the radical forms of continuous jiggers now in use.

The introduction of a continuous jigging-machine into our British mines is probably due to Mr. John Hunt, late of Falmouth. This gentleman employed an ore bed, two sieves, divided by a low partition, two ore chambers, and a horizontal flow of water. Hunt's specification, No. 707, is dated March 8, 1866, and clearly enough describes various functions of the fine sand jigger, since claimed by other patentees. At the end of the year 1867 I obtained drawings from the Eschweiler Gesellschaft of a four-piston jigger—an extended form of Hunt's machine; and shortly after built a three-piston jigger, using a variable link, for the purpose of shortening or lengthening the piston-stroke.

In order to dispatch stuff resulting from the reduction of lead, blende, or copper ore both coarse and fine sand jiggers are desirable; the former placed in connection with large-hole sizing trommels, the latter with small-hole ones, and with a single or divisional classifier. In the coarse sand jigger, stuff 10, 7½, 5, 3½, and 2 millimetre size is usually enriched on a plate the holes of which are of *less* diameter than the grains, whilst in the fine sand jigger, sand 1¼, ¾, ½, ¼, and 1-6th millimetre size is separated by the intervention of a bed of coarse-grain ore, supported either on a perforated plate or grid, the openings of which are *larger* than the grains to be collected.

For the purpose of effecting a good separation of ore from its gangue it is necessary to give great attention to the length of stroke, number per minute, and volume of flowing water. Every distinct class of vein stuff will necessitate the observance of specific conditions, so that no absolute data can be offered; as, however, approximative figures may be useful, the following are given:—Coarse sand jiggers, speed from 60 to 75 strokes per minute; flowing water required, depends on construction—say, nine to fifteen gallons each machine per minute. Fine sand jiggers, speed from 90 to 250 strokes per minute; piston and horizontal flow of water necessary—say, from fifteen to twenty gallons per minute. The approximate length of stroke required for stuff ranging in size from ten to one-sixth of a millimetre may be ascertained by placing the second set of figures under the first:—

Size of Stuff.—10, 7½, 5, 3½, 2, 1¼, ¾, ½, ¼, ⅛, and 1/16 millimetre.

Approximate Length of Stroke.—2½, 2¼, 2, 1½, 1¼, 1, ¾, ⅝, ½, 1-16th, and 1-25th inch.

The piston speed for strokes varying in length from 2½ to 1¼ in. is from 60 to 75 per minute, for 1 in. 100, ¾ in. 110, ⅝ in. 130, ½ in. 180, 1-16th in. 200, and 1-25th in. 220. JOHN DARLINGTON.

2, *Coleman-street-buildings, Aug.* 9.

WATER-BALANCE ENGINES.

SIR,—I believe that many years since it was stated in the *Mining Journal* that Mr. John Darlington had invented a water-balance engine, which could be practically applied either to mines or slate quarries, but I am sure I do not recollect which. As I have never read any mechanical description of the invention I do not know whether it was for raising the water or for raising the materials from the mine; but my assistance is now asked for a water-pressure engine for raising water without machinery to any required height, and perhaps Mr. Darlington would, therefore, state how his machine is operated. It seems that in this new machine it does not matter what height the water has to be raised to, but the greater the height the slower will be the flow; this is easily accounted for. The water is forced up by a plunger which descends in its cylinder by its own weight, and I am told that the smaller the pipe within certain limits up which the water is forced the greater is the height to which the water can be forced.

It is for this reason that I should be glad if Mr. Darlington or any other correspondent of the *Mining Journal* could state what weight must be given to a plunger 2 feet square, in order to make it force 8 cubic feet of water through a 1-in. pipe to the height of 50 feet, and whether (assuming the weight of the column of water to be the same) it would make any difference if it were a 50-ft. pipe 1-in. diameter or a 25-feet pipe of double the calibre. And how long would it take to force the 8 cubic feet of water up the pipe (the pipe of course being full at the commencement of the down stroke of the plunger); also the difference of time if a long thin and short broad pipe would give different results. If it could really be arranged that by any cheap automatic machine standing water, as the water of a well could be raised to the top of a dwelling-house, I am sure any inventor could make a handsome fortune from introducing it; and a very small flow continuously would afford an abundance of water for ordinary domestic purposes. If such a plunger as I have mentioned would make but half-a-dozen strokes an hour, there would be no cause for any other system of water supply. MOTOR.

New York, July 15.

IMPROVEMENT IN BLAST-FURNACES.

SIR,—In the Supplement to last week's Journal I notice another improvement in the construction of blast-furnaces, which has been introduced by Mr. Crossley, at the Furness Iron and Steel Works at Askam, and it seems that, whilst closely following the Cleveland practice, he has made such modifications as adapt it to the Lancashire hematites. Now, it appears to me, from the observations contained in Mr. Crossley's paper, that the kind of furnace to be used must depend almost as much on the kind of iron to be produced as on the character of ore at disposal. This will, I think, account for the widely different section of furnace used in South Wales, Lancashire, Scotland, and other districts; but perhaps neither the ore nor the flux has as much to do with it as the fuel. Where there is an abundance of charcoal almost any small furnace suffices, because the ore gets no contamination from the fuel, but only from the ore when it has any, and it is for this reason that so much importance is attached by some to the use of peat as a fuel for smelting iron. Peat contains often some sulphur, but it is usually in such a condition that it does not mix with the finished iron, and is, therefore, almost as good as charcoal.

Now, the question is, how should iron be smelted with peat? for I am sure none of the patented notions for condensing or compressing peat will be of any use to the iron smelter. The whole process is too expensive, so that the finished iron cannot be sold even at a price to compete with foreign charcoal, and to supply it at the price of coke-iron is impossible. Mr. Ferrie has shown that, by using partitions in a blast-furnace, you can use very high furnaces with very tender coal, but even the Ferrie furnace would not answer with peat, because the peat is considerably lighter than any coal I have seen. The only way I know would be to crush up the richer hematite iron, and carefully mix it with the necessary flux and peat in powder, and then blowing the mixture into a large fire-chamber, surmounted by a very high stack. The stack should be far enough from the floor of the fire-chamber to prevent the fine iron going up the chimney, and the whole mass should be kept incandescent for as long a period as possible. I believe that by this means all the iron would be separated, so that it could be run off, and there would be no trouble to puddle the iron thus obtained in a reverberatory furnace constructed for the burning of peat. Peat gives a splendid flame, and once get a good raw iron with peat fuel we might be independent of foreigners for all the finest kinds of iron. PUDDLER.

Aug. 1.

GAS IN METALLIC MINES—THE FALCON CLIFF MINING COMPANY.

SIR,—In last week's *Mining Journal*, in the report of the meeting of the Falcon Cliff Mining Company, held at Liverpool, the mining engineer, Captain John Barkell, is stated to have reported that, "as they approached the Glen lode in the cross-cut from Critchley's shaft the men had been met by large quantities of gas issuing from the ground in the forebreast, of such a nature as at times to paralyse them, and render them unable to work, their candles all the while burning brightly, a feature to which all practical men would know that Capt. Barkell was justified in attaching great importance, this gas being only found in rich mines, and in the immediate neighbourhood of large bodies of ore."

As I never before heard of this discharge of gas from metallic mines, I should like to be enlightened by some of your correspondents as to its existence and nature. From the candles burning brightly one would imagine it to be oxygen, for hydrogen gas would cause an explosion, and carbonic acid gas would simply extinguish the lights. ENQUIRER.

London, Aug. 8.

MINING IN AUSTRALIA—ENGLISH CAPITAL.

SIR,—In this morning's *Argus* there appears a paragraph, informing us that Mr. Gideon S. Lang proceeds to England for the purpose of raising capital, and procuring the services of those competent to reduce silver ores found in the St. Arnaud district. I write these few lines for the benefit of English capitalists. In the first place, recent events show that there is no lack of capital for mining investments; and, secondly, we have those who are fully competent to treat both auriferous and argentiferous ores. Mr. Baltestuds, recently the owner of a quartz claim, Bendigo, prior to his leaving for his native land (Prussia), a few weeks ago, sold his claim to Mr. G. Lansell for 30,000*l.*; this gentleman has since refused 120,000*l.* for his purchase, and it may be remarked he is in receipt of some 2500*l.* a week dividends. Again, a Mr. Korls disposed of, on Saturday last, his claims undeveloped, and a battery of stamps of 48 heads (used for public crushing), and 48 heads in course of erection, for 75,000*l.*, in 1000*l.* shares; these rose 33 per cent. in value in 24 hours. The dividends from this district alone amount to 12,000*l.* weekly, and are gradually increasing—*vide* my report on the Bendigo gold fields, and which appeared in the *Mining Journal* of December, 1869. Mr. G. Foord, an able chemist, and now one of the assayers to the Mint, and a popular lecturer, treated these ores successfully, and there are others who are fully competent to do the same; therefore, I have thought it incumbent on me to deny a statement which is void of truth.

In the district of Castlemaine, where I am at this moment, I have just walked over a claim adjacent to the Australian United Gold Mining Company—the Duke of Cornwall—which is considered a magnificent property, and so will your readers when I tell you it is traversed by a lode 70 ft. thick, producing 1 oz. per ton. This claim is the property of Messrs. Rowe Brothers. If English capital cannot be obtained to work a property now in their possession, and valued at 100,000*l.* sterling, I do not think they will care much about mining for silver ores in St. Arnaud district, unless they are in every way satisfied that the statements made in the said paragragh are correct.

I have sent you the *Argus* of this day's date, containing the summary for the month. [The mining news referred to will be found in this week's Supplemental sheet.] By the mining news you will find that my remarks are fully borne out by facts. Not a moment to spare, the mail being about to close, but I could not refrain from calling, in the interests of *bona fide* mining, your attention to a paragraph which, no more or less, libels the country. By next month I will prepare you a statement concerning the present aspect of mining and gold resources, THOS. CARPENTER,

Victoria, June 17. Mining Engineer, Assayist, and Metallurgist.

SILVER MINING—IN ENGLAND AND ABROAD.

SIR,—In resuming my remarks on English Silver Mining, I had better say at once that it is beyond the power of anyone honestly to condemn it, for not a single instance can be recalled where capital has been exclusively employed in silver mining in this district that it has not been a success, and in some instances almost beyond conception, although it has had to contend with incompetence and cupidity. If the silver mines of this district when last worked had had the benefit of recent discoveries it would have won a name inferior to no district in the world, and, unless I am much mistaken, it will yet do this. But let me give a word of advice in passing to those who have in keeping the good name of the district—Do not frustrate the object you have in view by a too limited application of capital. If you believe in the abilities of your men see that they have the means to erect works for extracting the silver the most perfect and efficient, and then beyond doubt the success to follow will be great beyond expectation. There is plenty of capital in England, and those who possess it are quite open to supply it where there is honesty of purpose and a fair chance of its return. Thousands there are, I know, ready and willing to contribute their 10*l.* or 100*l.* to prove the supremacy of the dear old country in this as well as in other matters. You have no doubt heard much of the productiveness of the Queen Silver Mine, but perhaps it has not occurred to you that all the silver that has been sold from this mine during the last three years has been produced from a piece of ground not 20 fms. in length, and in the Prince of Wales Mine, adjoining, I am told it does not reach even to this extent, and I think not more than about six men in each mine are employed on it now. Just conceive of each mine having twenty times this amount of ground laid open, and then, with the necessary extraction works, you may, even without the rich deposits, calculate on returning from each mine upwards of 3000*l.* worth of silver per month; but if they were to meet with such rich branches as the East Cornwall mines have produced, and will again, worth 10,000*l.* per fathom, what can you say then? The Queen has already had a taste of it, and I have no doubt there is many more in store.—*Harrowbarrow, Aug. 9.* C. PENGILLY.

THAMES GOLD FIELD, AUCKLAND, NEW ZEALAND.

SIR,—I was agreeably surprised to see an article, extracted from the *Mining Journal*, in the *Daily Southern Cross*. In regard to our mines on this gold field, I can, without hesitation, affirm that they are second to none in the world, and for the investment of capital unsurpassed. In this colony (New Zealand) 15 per cent. is very low for interest on property, and our mines give over 100 per cent., as you will see by the enclosed list of dividend-paying mines.

I see by the *Mining Journal* that a company is being formed in London, under the title of the London and Thames River Golden Crown Company (Limited), for the purchase of shares in the Golden Crown Mine. Now, I would not wish to depreciate the stock of any company; but the truth is, what would far better suit the English capitalist would be to form a Mutual Investment Company (say) of 10,000 shares, at 1*l.* each, and buy shares in good dividend and progressive mines, and I am confident that, should such a company be formed, the shareholders would make 50 to 100 per cent. The fact is, there is very little capital in this colony. The immigration here is chiefly composed of the working classes, who have little or no capital. Thus it is that men with (say) 500*l.* to 700*l.* at their command invariably make fortunes. The investment of capital here would give better percentage than in any part of the world. I have had good experience of Cornish mining and the London Mining Exchange, but I can assure you that this gold field offers inducements for the investment of capital never to be met with in Cornish mining—indeed, it is unequalled.

For instance—the Thames Investment Company (Limited), capital 60,000*l.*, in 6000 shares of 10*l.* each, pay fortnightly dividends of 4*l.* per share; market price of shares, 36*l.*

Then the Caledonian Mine, capital 34,320*l.*, being 2860 shares of 12*l.* each, is paying fortnightly dividends of between 20*l.* and 25*l.* market price of 160*l.*

Two investment companies have been started for the purpose of investing in good mines, and I have no hesitation in saying that they will pay good dividends to their shareholders.

The wonderful richness of this quartz field is proved by the enormous yield obtained from the Caledonian and other dividend-paying mines, and I am glad to be able to add that as our mines go deeper the richer they prove. I shall be glad at any time to give your readers, to many of whom I must be known, any information in respect to this gold field; and should a company be formed I would advise either the purchase of shares in the existing Investment Company (Limited) we already have, or else a judicious selection of the best dividend and progressive mines in the field.

Auckland, June 10. JOHN ROBT. BAYLIS, Sharebroker, &c.

Thames Gold Field, New Zealand.—List of Dividend-paying Mines, May, 1871:—

Mine.	Shares.	Last dividend.	Payable.	Market price.
Caledonian	2860	£25 0 0	Fortnightly	£175 to £200
Thames	6000	4 0 0	ditto	33 to 36
Golden Crown	192	10 0 0	Monthly	350 to 400 nom
All Nations	5400	0 10 0	ditto	5 to 6
Dauntless	3200	0 1 0	ditto	13s. to 15s.
Long Drive	1200	1 0 0	ditto	13 to 14
Nonpariel	5700	0 10 0	ditto	3½ to 5
Nolan Candlelight	3600	0 1 0	ditto	1 to 1⅛

HOME AND FOREIGN MINING.

GOLD AND SILVER V. IRON.

SIR,—Excepting those inheriting broad acres and swollen rentrolls—the accumulation of past ages, acquired through ancestral industry and practical intelligence—with those possessing wealth and opulance, such as our merchant princes, millionaire bankers, merchants, manufacturers, miners, and capitalists, let us confess ourselves, as we unquestionably are, a nation of traders and shopkeepers; and, in the same breath, let us add that if we make our money working like horses, we not unfrequently fool it away like asses. The accumulation of years, the product of industry, perseverance, and integrity, is often dissipated through embarking in a highly pitched scheme, and that too of the most abortive character, which the slightest exercise of judgment or of ordinary caution would have detected the flagrancy and worthlessness of at starting. Why should a prospectus with a sprinkling of peers, or a report with a preface of M.P.'s, such as those of the Californian and Nevada mines, or rather quarries, on the top of hills, in many cases inaccessible for want of roads and powers of locomotion, command, as if by magic, our universal confidence, and absorb the proceeds of our toil from our breeches pocket? If a petty trader or shopkeeper has 50*l.* or 100*l.* more than he wants, and wishes to put it by, he has nothing to do with great people who sit at "boards." He has not the means of knowing anything about them, nor is he in a position to acquire correct data and intelligence in regard to the highly vaunted schemes with which their names are associated. His lifetime has been devoted to hard bargains in his peculiar avocations, and his savings have been slow though sure. Why, therefore, should he not devote his talent in seeking good investments at home from the many hundreds open to his investigation and selection, instead of going headlong to destruction, in the blind belief that "Jonathan" is going to leave English cunning to absorb their mineral properties, so as to remunerate outside shareholders, who join companies at 500 per cent. premium on the *working capital* subscribed? Careful traders and shopkeepers, who earn with much care, contrivance, and self-denial something yearly beyond the costs of their subsistence, should avoid all such sparkling concoctions as emanate under the circumstances referred to in respect to gold and silver mining in Colorado. The investor should consult an intelligent stockbroker, or practical mining authority, from whom he would learn that the best bargains are not often in those undertakings most loudly advocated, and swim most smoothly, apparently to superficial observers, on the surface currents of the markets. There is at times to be discovered a security in a stock or share to all appearances helplessly depreciated, which even Consols do not possess; inasmuch as the market value has fallen to that point at which depreciation can go no further, and from which, if there be a change, it must be of necessity for the better. The "Science of investments" requires earnest thought and severe study. All commerce has its risks, yet the buying and selling of stocks and shares have less risks than most kinds of trading and barter, provided that the conditions of prudence and forethought be brought to bear. The liability as to future calls must be known, and clearly established; all the purchase money must be paid; the buying must be made in the cheapest market, and the selling in the dearest. Sound investment is one thing, gambling is another. I advocate the former to all desirous of securing a healthy return of 10 to 12½ per cent. on capital embarked, and as regards the latter he usually blunders on until he has lost, little by little, the very little he possessed at starting.

The Nantyglo and Blaina Ironworks Company (Limited) is just at present being offered to the public at the price of 750,000*l.*, of which 500,000*l.* receives a preference interest of 8 per cent., whilst the gains are estimated at 120,000*l.* annually, equal to three times the sum necessary to pay the 8 per cent. preference interest. This company shows the vast mineral wealth of the country, and may be regarded as a well-secured home investment. The coal to win is estimated at 170,000,000 tons, and ironstone 50,000,000 tons. In my opinion this property will pay in England more money in dividends than all the companies introduced for working the gold and silver mines of Nevada and Colorado. There are other iron mines in Monmouth and South Wales that are about being launched, and which will pay investors a safe return of 10 to 12½ up to 15 per cent. These mines I would direct public attention to.

In Cornwall, again, there is North Pool, upon which 25,000*l.* has

been expended, and a considerable capital remains to protect the future. Shares can now be purchased at much advantage to incoming investors. Gains from one deposit of ore were given at 64,500*l.*, and from the masterly character of the lode at Ballarat shaft there is strong promise of early and important discoveries. Again, there are several tin mines, that yield largely and afford safe channels for the profitable employment of capital, paying 10 to 12½ per cent. interest, whilst others are likely to advance 100 to 200 per cent. in market value during the current and ensuing year, and to which I would strongly direct the attention of the investing public.

It must be remembered that mines worked in America usually do little or no good to the mother country. The capital is spent abroad. the labour is of foreign growth, the profits of merchants for supplies of machinery and materials, with rare and exceptionable instances, do not advantage the home market, whilst in working such undertakings as are embraced in the Nantyglo and Blaina Ironworks Company (Limited) there is scarcely any *limit* to the good attained at home. The vast labour emboddied is a boon incalculable to the working classes: tradesmen and shopkeepers are benefitted through the expenditure of the men's weekly wages; whilst the coal and iron produced, irrespective of the 120,000*l.* annually to shareholders, creates employment throughout our manufacturing districts, and enriches numerous branches of our trading and commercial communities. R. TREDINNICK, Consulting Mining Engineer.

Crown-court, Threadneedle-street, London.

PAYMENT OF TRIBUTERS.

SIR,—The statement of your correspondent, "B. S.," that two tributers whose ore was sold in the same parcel received the one 10s. 6d per unit, and the other 12s. 6d. per unit, shows that the system of paying tributers stands upon an altogether erroneous basis, and loudly calls for readjustment. When all mines were selling ore of nearly similar quality it might have been just possible to purchase all ore offered at a given sale at one uniform standard, but I believe that in all time a rule of thumb allowance has been made in settling the standards for parcels of ore of varying produce; hence the old maxim "one in the produce two in the standard," but in the payment of tributers it is impossible to go into minute calculations of this kind, so some rough table is adopted, or an arrangement is made for determining the standard upon which the ore shall be paid for. The use of a fixed standard, however, appears to assume that the cost of extracting the copper contained in an ore is just the same whether each ton of ore contains 1 cwt. or 12 cwts. of fine copper; yet this can scarcely be, because in the one case we shall have 19 tons of worthless material to melt, or nearly melt, and in the other we have considerably less than ¾ ton of worthless matter. This is the reason the miner who gets low produce ore should properly receive less per unit than he who gets high produce ore, but we must take care that the man who gets 8¼ per cent. ore is not overpaid at the cost of the unfortunate fellow who get but 5¼ produce ore.

Smelters naturally study their business as much as other men study theirs; and Dr. Percy states, on the authority of Sir W. Logan, who has had great experience in copper smelting, that the cost of extracting 1 ton of copper from the ore which contains it varies exactly in proportion to the produce; and curiously enough the rule he gives, that for ore of the produce usually sold in Cornwall "one in the produce, two (pounds) in the cost of getting it out of the ore," would not be so very wide of the mark. Now, originally I believe the difference in the standard upon which tributers were paid for their ore was supposed to represent the difference in the cost of extracting the metal, for when I first tried to understand the Cornish system of paying for ores I was told that the standard was the price paid for the fine copper in the ore, with the addition of the returning charges, and that the returning charges represented the cost of extracting the ore. This may have been true many years ago, but it cannot be at present, unless the smelters are much more liberal than men of business generally. Thus, taking the last week's *Mining Journal* which contains a ticketing list the smelters paid the miners 60*l.* 13s. 6d. for each ton of fine copper in the ore, and the smelters had to pay the cost of getting out that copper and making it marketable. As the ore was 6¾ produce, about 15 tons of ore would be required to produce each 1 ton offine copper, so that at 2*l.* 15s. per ton the cost of extracting should be 41*l.* 5s., or, in other words, the smelter pays 60*l.* 13s. 6d.+ 41*l.* 5s.=101*l.* 18s. 6d. for a quantity of copper which is saleable in the market at 76*l.* to 78*l.* only. Liberal copper smelter! Well-paid miner!

But, as a mine adventurer, I neither believe that the miners are overpaid by the smelters, nor that the smelters are so excessively liberal. The error is in retaining the old and obsolete system of calculation; and if the working miners have anything to complain of (of course I mean the tributers), it is that while the smelters charge the mine adventurers only 1*l.* returning charges the mine agents charge the tributers 2*l.* 15s. returning charges. I know that in practice this is not done, but the retention of the fictitious figures leads to unfairness in the division of the money for any mixed parcel of ores of different produces. Mr. Jehu Hitchins has often told me tha what he calls his "logarithm" is 135—that is, he divides 135 by every produce, and so forms a table which enables those using it to guess at various standards for various produces. No doubt 135 would have given as accurate results as any other fixed number when the smelters were taking 1*l.* 7s. average returning charges, but as they have now for years taken but 1*l.* returning charges on the average, the fixed number, if used at all, should be altered to 100, which would exactly represent the 1*l.*

I am not, however, an advocate for any fixed number, because, on the showing of Sir W. Logan and Dr. Percy, no fixed number will give accurate results. To pay the miners fairly we must know the price per ton of ore, the price paid for copper in the ore, or the price per unit of the particular parcel, and calculate the price to be paid to the miner directly from the average price of fine copper, or where necessary the market price of tough cake copper can be made the basis of calculation. This is particularly convenient where a small smelter is purchasing from small miners, as it avoids all disputes as to the prices to be paid, and ensures an exactly uniform *rate* being paid for all ore, whether of good or indifferent quality. It would be very interesting to a large number of mine adventurers if mine agents in each district would state the system on which they pay the tributers, as notes might then be compared. ADVENTURER.

Aug. 2,

BRONFLOYD MINING COMPANY.

SIR,—The Bronfloyd Company has given notice to the members "that all future transfers of the shares must be made as parts of 100*l.* stock, in accordance with the conversion specially resolved upon at the ordinary meeting, held on October 26, and confirmed at a special meeting, held Nov. 9, 1870." This may be, and is, I believe, novel with regard to mining capital; but as this company is of as long standing as several of the railway companies which are so quoted, and of older date than many in the miscellaneous list of companies published in the Daily List of the Stock Exchange, there appears to be no good reason why such conversion, under the Acts for the government of joint-stock undertakings generally, should not be taken advantage of by the Bronfloyd, or by any other company, *if their members respectively so determine.*

It may not be generally known that the power of conversion of paid-up shares into stock was omitted from the original Joint-Stock Companies Act, 1856, and that such omission led to—and, in fact, formed—the principal sections of the Amended Act, 1857, the object being to confer by this last-named legislative enactment *equal* privileges to *all* companies as were then, and are now, in that respect possessed by railway companies under the Clauses Consolidation Act, 1845.

The stock of any company is transferred with equal, if not greater, facility than shares; and, in the Bronfloyd case, forty 2*l.* 10s. shares will represent 100*l.* stock, and henceforth the whole or any portion of that 100*l.* stock can be divided and transferred in precisely the same way as any holder of Midland or other railway stock can transfer and subdivide his 100*l.* stock among twenty or more persons. Thus, if a holder can so transfer and divide his interest, so, in like manner, can an investment in stock be made by the public *of any sum, be it small or great.*

I am told that there are fancied interests alleged to be affected by this decision. For myself I do not see in what they can possibly consist; and, in my opinion, a judgment pronounced without due examination of the facts—which are always necessary to be known in order to arrive at a *fair* and impartial decision—is *mischievous and prejudicial to progress.* I, therefore, have nothing whatever to do with that; my sole desire is to protect my proprietary, and I believe this action on its part will prove to be wise, and tend to neutralise other and inimical interests.

The simple fact of the conversion of paid-up shares into stock carries proof on the face of it of non-liability in respect to such stock, and as mines are sought for investment, and such investments are largely on the increase, taking a range of proportions hitherto unknown, the carping of the few to whom I referred at the late meeting should not be allowed to have a chance, however remote in its calculation, of affecting such a property as Bronfloyd.

Now, investments are daily made by persons from whom it was common enough years ago to see evidences of fright at the bare idea of holding a mine share. The Limited Liability Acts have gradually swept these prejudices away, and, therefore, I believe that anything which can add to that security cannot be reiterated too often. I may, therefore, in conclusion, be permitted to repeat the words by which the resolution in question was introduced to the October meeting:—"The Chairman said the next matter on the agenda emanated from himself, which was to give the board powers to convert the paid-up shares into stock. There could be no reasonable objection raised against the proposition, while its adoption would tend, he thought, to give confidence to holders, and increase the proprietary; for notwithstanding that the Companies Acts, and the clauses of limitation of liability were pretty well known, yet there existed a latent feeling in many minds that some possible liability was more particularly attachable to shareholders in mining companies, even after the shares were paid up. In his opinion, therefore, it became a duty to remove such impression; and, as the dividends now payable on the shares of this company will presently be still further increased, so its stock should become a favourite class of secure investment, and be dealt in like the stock of railways and other public companies."

Bryn-y-mor, Aberystwith, Aug. 10. J. B. BALCOMBE, Managing Director.

WHEAL SETON, AND ITS MANAGEMENT.

[ADDRESSED TO THE ADVENTURERS.]

SIR,—The next general meeting of shareholders in this mine to be held at the account house, on Monday, Aug. 14, it is my intention to attend, for the purpose of getting a resolution passed, if possible, to stop any further waste of money on the north part of the sett, called "Trevornoe." I am given to understand that something like 15,000*l.* has been spent on this north part without any chance of profit. I happen to know also that it was the advice of a thorough practical miner of great experience *not* to work it, he being convinced that it would never pay, and in consequence of a recent interview with the same experienced miner I feel certain it never will pay the shareholders in general, though, no doubt, it does answer the purpose of *some* to hold shares, even if they do not receive dividends. It appears to me that the only shareholders who reap any benefit by prosecuting this part are those who are included in the statement of accounts under the head of merchants. I will not say they hold their shares for the express purpose of reaping a profit out of the other shareholders by the goods or materials they supply to the mine, but as resident shareholders, and knowing that so large a sum—nearly equal to eight dividends of 10s. per share on the 396 shares—has been wasted, I cannot help coming to but one conclusion, and I leave you to form yours. I firmly believe that by ceasing the operations in the north part, and working the old mine in a judicious manner, that Wheal Seton will soon resume its place as a dividend mine. I would just draw your attention to Tincroft and Carn Brea Mines, to show what judicious management has done for the former, and is doing for the latter; and I firmly believe the same results can be obtained by Wheal Seton if judiciously managed. Let us, therefore, bestir ourselves, and insist upon our interest, as a body, being studied, and that without delay.

Should you not be able to attend the meeting, and you approve of my views on this matter, I shall feel obliged by your appointing me your proxy, for which purpose I enclose a form for your signature. You may rest assured that I, as the proprietor of 14 shares out of the 396, will do my utmost for the benefit of the shareholders, especially for those who are not able to attend. There was on June 22 last 141 shareholders, averaging, therefore, less than 3 shares each. One gentleman holds, I believe, 50 shares, which with my 14 makes 64, leaving 139 shareholders, holding between them the remaining 332 shares, or an average of less than 2⅜ shares each. GRANVILLE SHARP.

WHEAL SETON, AND ITS MANAGEMENT.

[ADDRESSED TO THE ADVENTURERS.]

SIR,—Having only just been able to procure a copy of Mr. Sharp's circular, but which I think, in fairness, he ought to have sent me, as purser of the mine and a shareholder, I hasten to reply to it. It is, on the face of it, a very specious letter, and calculated to take by surprise and mislead the shareholders, who, unless they act with extreme caution, will suddenly find that they have ruined their property. The letter shows, too, a most thorough misconception of what mining adventure is, and what are the relative obligations of adventurers and the lords of whom they hold their property. It also contains, by implication, a charge against respectable merchants (who are in the habit of supplying the mine with materials at the lowest rates, and with the additional safeguard of public tender), which, unless Mr. Sharpe is prepared to substantiate it, is most unjustifiable and improper.

The allusion to Tincroft and Carn Brea is irrelevant—circumstances alter cases. Tincroft is one of our most valuable tin mines; and for its produce, which is high, the standard is at a maximum; while in the case of Wheal Seton, the tin is of low produce, and the copper standard has been at a depressed rate for a considerable time, and has materially affected us. I have no faith in Mr. Sharp's proposal to stop half the mine and work the other "in a judicious manner;" and, indeed, the whole tenor of his circular betrays an ignorance of our necessities and duties which, if not wilful, is at least inexcusable, and casts upon him the entire responsibility of causelessly dragging our property before the public, and disparaging it, and thereby seriously depreciating its market value. The expenditure on the northern part may have been as heavy as stated by Mr. Sharp, but that is nothing to the point. A much larger expenditure was borne by the old Wheal Seton adventurers before the mine returned 1d., and yet they did not abandon it, and they were afterwards rewarded with large profits. So in this northern part it was virgin ground, situate in the most valuable mining locality, practically untried and unexplored, and of considerable extent; and it is absurd to say that ground of such a character should have been left idle, and especially as at the time we commenced operations a splendid lode was cut in the adjoining sett of Emily Henrietta, situate from 70 to 80 fathoms to the east of us, in the 50 fathom level. Certainly no miner of experience would ever have proposed such a course, and if Mr. Sharp has one to produce, I hope the adventurers will have an opportunity of seeing him at our next meeting.

You must quite understand that I do not shrink from any enquiry into the working of Wheal Seton, or its management, but that I challenge anyone to show that it has not been conducted upon scientific mining principles, and with honesty and economy. It is discouraging, certainly, to pay a call, even if only once, as in our case, in about 12 months, but the adventurers must not thereby allow themselves to be biassed by unsound complaints, and thoughtlessly give away their proxies to a mere agitator. Now, our great object has from the beginning been to cut the lode on the west side of the cross-course, which has never been seen anywhere in the sett, and where we have a long extent of ground on its course. The prospects on the east side of the cross-course fully justified us in the determination to do so, while the land to the west of it was land of high mineral character, where good results were certainly probable. This cross-course heaved the north caunter lode about 30 fms. on the average, and we have driven the 64, north of Simmons's, about 30 fms. without cutting it, but it must be recollected that the difference in bearing between this lode and the north caunter may have been the effect of causing a greater heave of the lode.

It is also possible, as we considered from the first, that the 65 may be hardly deep enough to see the lode if we passed through it, and we have accordingly decided, if necessary, to drive the 80 north likewise, to cut it. After we had gone to great expense in buildings and machinery, and even after the mine had been drained, further expenditure became necessary to supply the proper amount of air to the miners, and we had accordingly to sink Simmon's shaft from the 12 to the 64, which took a long time to execute; and although this was sunk as was considered on the course of the lode, we had nothing but a wall to sink on until we got to the 64, when the lode began to form, hence arises the doubt whether the 64 cross-cut is deep enough to see the lode to the west side of the cross-course.

Independently of our duty as miners to explore this ground, we were required to do so by the lords of the mine, in pursuance of our covenants, and the result is that at the present time we have a fine lode in the 84, worth quite 3 tons of ore per fathom, and that from as careful an estimate as is practicable I find that the produce from this part of the mine will half pay the costs, even at the present low standard.

For many years past neighbouring adventurers have been anxious to obtain this sett, and in the event of our declining to work it, it will as a matter of course be revoked, and quickly pass into other hands, to, as I conceive, our great loss. As to the working of the mine without the Trevanoe portion it would be impracticable. You must, therefore, quickly decide who you will support, me or Mr. Sharp. If you support me, as you have hitherto done, I can only promise that while I will do nothing to lose the confidence of the lords, who have dealt with us most favourably, I will at the same time faithfully take care of your interests to the best of my power. If you have already inadvertently given a proxy to Mr. Sharp, and upon receipt of this letter wish to act differently, you can revoke it, by sending the one which I enclose executed in my favour.

Falmouth, Aug. 4. HARRY TILLY.

[For remainder of Original Correspondence see to-day's Journal.]

PERRAN WHEAL VYVYAN.—The progress made in opening out this mine since the formation of the company is very satisfactory, and does credit to the directors. A great change is now taking place on No. 1 lode. The agents are led to expect important discoveries shortly. During the last week a branch has been met with in sinking the shaft on the junction of the lodes, and from the favourable nature of the ground, being precisely similar to that of West Culverton, important results are expected when the junction is reached.

SOUTH CONDURROW.—This mine is pursuing the even tenor of its way, independent of what has been said against it. It has now got the 32 additional stamps to work, and having plenty of tinstuff for same, it ought to produce 50 instead of 30 tons of tin monthly, and consequently shareholders may expect a good dividend at the next meeting. Its prospect is certainly much better than some producing only about one-third the quantity, and yet whose shares are stated "ought to be from 10*l.* to 15*l.*" To an outsider (like me) it was difficult to know how it was that some mines which were actually valueless were puffed up and extolled, whilst others, good *bona fide* undertakings, were kept in the back ground, but the *Mining Journal* of July 29 has opened my eyes to the system, from which I have been a considerable sufferer.

RAILWAY LAMPS.—The object of the invention of Messrs. SILBER and F. WHITE, Camberwell, is to adapt lamps, and especially railway lamps, for burning mineral oils. For this purpose the oil reservoir communicates by supply pipes with a chamber provided with air-holes. In this chamber the burner is placed, and the wick dips into the oil in the chamber or vessel, so as to draw up the oil. The burner is also provided with air-holes. In the burner the wick passes through a perforated plate or wire-gauze, and the body of the burner is perforated in the seat which holds the chimney with a number of air-holes. These air-holes may be of conical shape, or broader at one end than at the other. There are also air-holes in other portions of the burner.

COMMISSION TO INQUIRE INTO THE SEVERAL MATTERS RELATIVE TO COAL IN THE UNITED KINGDOM.

At the first meeting of the Coal Commission, held on July 7, 1866, the Commission decided that it was expedient to divide their inquiry, and to appoint committees to investigate separate subjects; but that every member of the Commission should have leave to serve on any committee he pleased, in addition to that specially assigned to him. Five committees were then chosen:—

(1) A.—Committee on possible depths of working.
(2) B.—Committee on waste in combustion.
(3) C.—Committee on waste in working.
(4) D.—Committee on the probability of finding coal under Permian, New Red Sandstone, and other superincumbent strata.
(5) E.—Committee on mineral statistics.

The powers granted to the Commissioners were transferred to these committees. They were requested to examine witnesses, to inquire by all lawful ways and means, and to report to the Commission upon the subjects specially assigned to them.

In order to investigate the probable quantities of coal contained in the known coal fields of the United Kingdom and available for use, it was agreed Oct. 10, 1866—That the quantity of coal in each field, worked and unworked, be inquired into by separate members of the Commission, and that for carrying out this object the United Kingdom should be divided into 13 districts, which were assigned to different members. The inquiry assigned to the Commission at first was thus separated into 18 divisions. Later on it was found expedient to subdivide the geological inquires assigned to Committee D, and to assign some branches to gentlemen who do not belong to the Commission. Thus 23 separate investigations have been carried on simultaneously.

When separate coal districts were assigned to members in October, 1866, it was seen that paid assistance was necessary to carry on inquiries of great magnitude and difficulty. Accordingly, application was made for sanction through the Home Office to the Treasury in the usual manner. On March 12, 1867, the necessary sanction was granted by the Treasury upon estimates prepared by the Commissioners to whom districts had been assigned, and by the Chairmen of the five committees.

The members chosen, as soon as sanction was got, proceeded each on his own plan to investigate the probable quantity of coal in each district which might be reasonably expected to be available for use, and they reported separately from time to time as their work was completed. Their reports are separately printed in Vol. I. The progress of this part of the work is shown in the general minutes of the Commission, which have been sent to the Home Office from time to time.

On Dec. 22, 1868, a sixth committee was named to select maps, and to obtain Treasury sanction to their publication. It has been necessary to print the minutes, evidence, and other proceedings, because each of the 16 members of the Commission, under the minute of July 7, 1866, was also a member of all the committees, and had to be informed of their progress and proceedings. The secretary had no assistance in his department.

On March 16, 1870, it was decided to assign the drafting of the general report to a seventh committee, to consist of the following gentlemen:—Sir William Armstrong, Mr. Woodhouse, and Prof. Ramsay. The secretary to serve on this in addition to the other committees.

On June 9, 1871, the work had so far advanced that the reporters held their first meeting. Their draft report is founded upon 23 sub-reports made to the Commission by their committees, and by the members to whom separate subjects and districts were assigned.

The known coal fields of Great Britain and Ireland are—

ENGLAND.—1, South Wales; 2, Forest of Dean; 3, Bristol and Somerset; 4, Warwickshire; 5, South Staffordshire; 6, Coalbrookdale and Forest of Wyre, Shrewsbury and Lo Botwood; 7, Clecbills; 8, Leicestershire; 9, North Wales (Flint and Denbigh); 10, Anglesey; 11, North Staffordshire; 12, Cheshire; 13, Lancashire; 14, Midland (Yorkshire, Derby, and Nottingham); 15, Northumberland and Durham; 16, Black Burton; 17, Cumberland.

SCOTLAND.—The great coal fields between the Firth of Forth and Clyde, and others—18, Edinburgh; 19, Lanarkshire; 20, Fifeshire; 21, Ayrshire; 22, East Lothian; 23, Firth of Forth; 24, Dumfriesshire; 25, West Lothian; 26, Perthshire; 27, Stirlingshire; 28, Clackmannanshire; 29, Dumbartonshire; 30, Renfrewshire; 31, Argyllshire; 32, Sutherlandshire; 33, Roxburghshire.

IRELAND.—34, Antrim; 35, Dungannon; 36, Tipperary; 37, Kilkenny.

POSSIBLE DEPTH OF WORKING.—Large portions of some of these coal fields lie at a greater depth than has yet been reached in mining; and it has been an important subject of investigation to determine the maximum depth to which it would be possible to work coal. This branch of the inquiry was assigned to Committee A; and the substance of their report is:—

1.—The increase of temperature which accompanies increase of depth is the only cause which it is necessary to consider, as limiting the depths at which it may be practicable to work coal. In this country the temperature of the earth is constant at a depth of about 50 ft.; and at that depth the temperature is 50° Fahr. The rate of increase of the temperature of the strata in the coal districts of England is in general about 1° of Fahrenheit for every 60 ft. of depth.

2.—High temperature of the strata operates as an impediment to deep working, by heating the air circulating through the passages of the mine. This heating process is most rapid at first, when the difference of the temperature between the air and the strata is greatest, and gradually diminishes as the length of the passage is extended, never ceasing until complete assimilation of temperature is effected. The progress towards the assimilation of temperature is much more rapid when the air comes in contact with the working face of the coal, which, from being newly exposed, is more highly heated than the surfaces of the permanent air courses. The rapidity, however, with which the air takes up heat from the working face depends in a great degree upon the system of working. In the cellular system, called "pillar and stall," the air seems to acquire almost immediately the full temperature of the coal. But under the "long wall" system there are instances of the air retaining a considerable inferiority of temperature after sweeping past the working face.

3.—The great outlay of capital involved in sinking pits to coal lying at extreme depths would render it necessary to work a large area of coal from each sinking; and this would involve air courses of great length. At short distances from the shaft increased ventilation has a considerable influence in lowering temperature; but at long distances from the shaft the cooling effect of increased ventilation becomes insignificant.

4.—The absorption of heat from the strata by the circulation of the air gradually lowers the temperature of a mine. This reduction of temperature is most rapid when the air courses are new, and it takes place to the greatest extent near the shaft where the air is coldest. From the evidence it appears that the largest reduction of temperature thus effected at distances exceeding 2000 yards was 6° of Fahrenheit; while at distances exceeding 3000 yards it was in no case more than 1½°.

5.—The question of the maximum temperature of air which is compatible with the healthful exercise of human labour was very difficult to decide. Evidence was given of extraordinary temperatures endured in the stoke-holes of steamers, and in the places where glass-blowers work. In some of these cases labour has been carried on, without serious detriment to health, where the thermometer has indicated 180° Fahr. In these instances, however, the thermometer was chiefly acted on by radiant heat, and, therefore, did not truly indicate the actual temperature of the air. In an experiment made under the direction of the Committee, it was found that a thermometer suspended in a stoke-hole, and exposed to the radiation from the boilers, indicated a temperature of 105°, while another thermometer in the same position, but carefully screened from the radiant heat, stood at only 78°. It is important also to observe that the men who work in stoke-holes and glass-houses have ready access to the external air, and avail themselves of numerous intervals in their labour to cool themselves. One of the medical witnesses, who had spent a great part of his life in tropical climates, states that he had experienced a temperature of 120° Fahr. in the shade, and that this great heat was rendered quite endurable by the dryness of the atmosphere. On the other hand, he had felt a damp atmosphere almost intolerable at the comparatively low temperature of 86°. The Committee had information of mining work being executed in a Cornish mine, where the air was heated by a hot spring to a temperature which was said to amount to 117°, and was also by the same cause saturated with moisture. They, therefore, deputed Dr. John Burdon Sanderson to visit this mine, and investigate the facts of the case. He found the highest temperature to exist at the extremity of an excavation, forming a short cul de sac, where a stream of water entered at a temperature of 114½°. At a distance of 1 yard from the end of this cul de sac the thermometer indicated a temperature of 103°, but at a distance of only 10 ft. there was access to air, where the thermometer stood at 81°. According to other evidence, the temperature of the air occasionally reached 123°. The miners remained in the workings six hours out of the 24. Four men were employed at a time, of whom two were always at rest in the cool air, and the other two were not always at work, the time occupied in resting being considerably more than that occupied in working. Thus the total duration of each man's work was less than three hours in the 24. No miner remained more than 15 minutes in the heat at one time. Dr. Sanderson described the condition of each miner on retreating into the cool air to be one of complete exhaustion, but by allowing cool water to pour over his body the distress and exhaustion quickly passed off; and he concluded that the occupation in question was not necessarily inconsistent with the enjoyment of vigorous health; but he found that there were many men who, after trying the work, were compelled to desist, on account of the distress and exhaustion which was produced.

6.—The evidence having shown that the question of maximum temperature under which work could be carried on in a coal mine hinges, in a great measure, on the hygrometric condition of the air, the Committee proceeded to enquire what was the state of the air in regard to moisture in coal mines? The observations which they collected on this point show that the air at the working faces of the coal was always humid, and often saturated with moisture. In general, however, the deepest collieries appear to be the dryest, although there does not appear to be any ratio between depth and dryness. The depth at which the temperature of the earth would amount to blood heat, or 98°, is about 3000 ft. Under the long wall system of working a difference of about 7° appears to exist between the temperature of the air and that of the stratum at the working faces; and this difference represents a further depth of 420 ft., so that the depth at which the temperature of the air would, under present conditions, become equal to the heat of the blood would be about 3420 ft. Beyond this point the considerations affecting increase of depth and temperature become so speculative that the Committee felt it necessary to leave the question in uncertainty; but, looking to the possible expedients which the future may elicit for reducing the temperature, they considered it might fairly be assumed that a depth of at least 4000 ft. might be reached.

WASTE IN WORKING.—Another consideration affecting an estimate of the quantity of available coal is the amount of waste incident to mining it. This question was assigned to Committee C, who were requested to inquire "whether there is reason to believe that coal is wasted by bad working or by carelessness?" According to their report, although in many instances waste in working is reduced to a minimum, and although manifest improvement is being made in the working of coal, especially by the extension of the system of "long wall," nevertheless coal is wasted by bad working and by carelessness, and that to a very considerable amount in proportion to the amount which is actually used. Under favourable systems of working the loss is about 10 per cent., while

in a very large number of instances the ordinary waste and loss amounts to 40 per cent. In addition to this waste by working much coal is sacrificed by the necessity for leaving coal for barriers, and for the support of buildings and for other objects. The waste and loss from these causes vary much in different districts.

QUANTITIES OF COAL IN KNOWN COAL FIELDS.—Adopting 4000 ft. as the limit of practical depth in working, and accepting the estimate of each Commissioner for the waste and loss incident to working the coal in the district assigned to him, we now present the following estimate of the quantities of available coal contained in the several districts which together comprise all the coal fields above enumerated.

Summary of Results of Reports as to Quantities of Coal Worked and Unworked in Certain Districts:—

Commissioner, and Number on his Report.	No.	Name of Coal Field.	Coal in Statute Tons at depths under 4000 ft., after necessary deductions.	Coal in Statute Tons in each Coal Field after the necessary deductions.
Mr. Vivian..... Mr. Clark	1	South Wales	32,456,208,913	*a* 36,566,195,917
Mr. Dickinson ..	2	Forest of Dean	265,000,000	*b* 265,000,000
Mr. Prestwich ..	3	Bristol	4,218,970,762	*c* 6,104,310,982
Mr. Woodhouse..	4	Warwickshire	458,652,714	*d* 458,652,714
Mr. Hartley	5	South Staffordshire		
ditto	6	Coalbrookdale and Forest of Wyre..	1,906,119,768	1,906,119,768
ditto	7	Clee Hills		
Mr. Woodhouse..	8	Leicestershire	836,799,734	836,799,734
Mr. Dickinson ..	9	North Wales	2,005,000,000	2,005,000,000
ditto ..	10	Anglesey	5,000,000	5,000,000
Mr. Elliot	11	Nth. Staffordshire.	3,825,488,105	*e* 4,826,273,593
Mr. Dickinson ..	12	Lancashire and Cheshire	5,546,000,000	*f* 5,636,000,000
Mr. Woodhouse..	13	Midland	18,172,071,433	*g* 18,406,799,443
ditto ..	14	Black Burton	70,964,011	*h* 70,964,011
Mr. Foster ..... Mr. Elliot	15	Northumberland and Durham	10,036,660,236	10,036,660,236
Mr. Foster	16	Cumberland	405,203,792	405,203,792
		SCOTLAND.		
Mr. Geddes	17	Edinburgh	2,153,703,360	[2,153,703,360
ditto	18	Lanarkshire	2,044,090,216	2,044,090,216
ditto	19	Fifeshire	1,098,402,895	1,098,402,895
ditto	20	Ayrshire	1,785,397,089	1,785,397,089
ditto	21	East Lothian	86,849,880	86,849,881
ditto	22	Frith of Forth	1,800,000,000	1,800,000,000
ditto	23	Dumfries-shire	358,173,995	358,173,995
ditto	24	West Lothian	127,621,800	127,621,800
ditto	25	Perthshire	109,895,040	109,895,040
ditto	26	Stirlingshire	106,475,436	106,475,436
ditto	27	Clackmananshire..	87,563,494	87,563,494
ditto	28	Dumbartonshire ..	48,618,320	48,618,320
ditto	29	Renfrewshire	25,881,285	25,881,285
ditto	30	Argyleshire	7,223,120	7,223,120
ditto	31	Sutherlandshire ..	3,500,000	3,500,000
ditto	32	Roxburghshire ..	70,000	70,000
		IRELAND.		
Prof. Jukes, Commissioner (deceased), and Mr. Hull	33	Ballycastle, Antrim County	16,000,000	16,000,000
ditto	34	Tyrone	6,300,000	6,300,000
ditto	35	Leinster, Queen's..	77,580,000	77,580,000
ditto	36	Tipperary	25,000,000	25,000,000
ditto	37	Munster, Clare	20,000,000	20,000,000
ditto	38	Connaught	10,800,000	10,800,000
			91,207,285,398	*i* 97,528,126,210

These totals are increased by the addition of the estimated quantity of coal at depths exceeding 4000 ft., and after the necessary deductions:—*a*, 4,109,987,004 tons; *b*, nil.; *c*, 1,885,340,220 tons; *d*, nil.; *e*, 1,000,785,488 tons; *f*, 90,000,000; *g*, 234,728,910; *h*, nil.; *i*, 7,320,840,722 tons. It was an instruction, moreover, to the Commissioners to whom the districts were assigned to exclude from their returns all beds of coal of less than 1 ft. in thickness.

COAL UNDER THE PERMIAN AND NEWER STRATA.—The coal fields which form the subject of the foregoing estimates are limited to areas within which the coal-bearing strata are at the surface, or have been proved by mining operations to underlie more recent formations. But it can also be shown from geological considerations that large tracts of coal exist under the Permian, New Red Sandstone, and other superincumbent strata, in districts where at present it has not been proved by actual exploration. The determination of the extent of these tracts of coal has been the work of Committee D, by whom the United Kingdom was divided into four districts, which were assigned to competent geologists for the purposes of the report—Prof. Ramsay and Mr. Prestwich for England, Prof. Geikie for Scotland, and the late Prof. Jukes, who was succeeded by Prof. Hull, for Ireland. Before giving their results as to quantities of available coal contained in these unproved districts, the following brief statement of generally accepted geological facts connected with coal will assist in the comprehension of the subject:—Coal consists of mineralised vegetable matter occurring in seams, interstratified with beds of sandstone, shale, and ironstone, and more rarely of limestone, and these together are called the coal measures, which in some coal fields attain a thickness of many thousand feet. Originally the vegetable matter consisted of plants which grew and died on the soils where they flourished during the carboniferous epoch. Passing through the stage of peat, each bed got buried under successive sediments, and through the influence of time, chemical changes, and pressure of the overlying strata, passed into the state of lignite, and eventually became converted into coal. There is, therefore, now no further growth of coal in the coal measures. These carboniferous strata while being formed occupied immense areas, and in general terms may be said to have been deposited and more or less consolidated into horizontal rock masses. The Permian (the last of the Palæozoic formations), the New Red Sandstone and Marl, and other secondary or Mesozoic strata, succeed he carboniferous rocks in the scale of the geological formations, and these in their turn have in places been overlaid by tertiary and post-tertiary strata.

In estimating quantities of coal under newer formations, the same depth as before stated—4000 ft.—was adopted as the limit of practical working, and allowance for waste and loss of coal was made in conformity with those adopted by the Commissioners who reported upon the quantities contained in the known coal fields. The results of these estimates of Committee D are exhibited in the subjoined tabular statement:—

Summary of Probable Amount of Coal under Permian and other Overlying Formations at depths of less than 4000 feet; 40 per cent. deducted for loss and other contingencies:—

Districts.	Under.	Sq. Miles.	Tons.
Warwickshire	Permian	73	2,165,000,000
Warwickshire, south of Kingsbury	New Red	5	150,000,000
Warwickshire, north of Atherstone	ditto	6	179,000,000
Leicestershire, Moira District	Permian	15	1,000,000,000
Leicestershire, Coleorton District..	New Red	25 to 28	790,000,000
District between the Warwickshire and So. Staffordshire coal field..	Permian and New Red ..	116	3,400,000,000
District between South Staffordshire and Shropshire coal field..	ditto ..	195	5,800,000,000
Between the So. Staffordshire and Coalbrookdale coal fields to the Cheadle and No. Staffordshire ..	ditto ..	200	4,580,000,000
East of Denbighshire coal field ..	ditto ..	50	2,489,000,000
West and S.W. border of the North Staffordshire coal field	ditto ..	50	1,500,000,000
Cheshire, west of the Kerridge....	ditto ..	9	62,000,000
Cheshire, between Woodford fault and Denton	ditto ..	36	1,790,000,000
Lancashire, east and west of Manchester	ditto ..	30	350,000,000
Lancashire, west of Eccles and Stretford to Prescott, Runcorn, and Hale on the Mersey	ditto ..	130	3,833,000,000
The Wirrell, the Mersey, and country to the north..	New Red	216	3,000,000,000
Yorkshire, Derbyshire, and Nottinghamshire	Permian and New Red ..	900	23,082,000,000
Vale of Eden	Permian	40	1,593,000,000
Ingleton and Burton.....	ditto	3	33,000,000
Severn Valley	New Red Marl	45	400,000,000
SCOTLAND.....	Permian	—	No estimate.
IRELAND—Tyrone	—	—	27,000,000
			56,273,000,000

Committee D has also investigated the probability of the existence of coal where its presence is not indicated either by mining operations or by the outcrop of carboniferous strata in the immediate locality. The following is the general purport of the report made by Mr. Prestwich on the probabilities of finding coal in the South of England. About two centuries ago the Belgian coal field was found to extend beneath the newer formation on the frontiers, into France as far as Valenciennes. An uninterrupted chalk district extended northward, and the coal measures were supposed to be lost. But at a later period valuable coal was found to exist at Anjin. This led to further search, and the coal measures have been gradually followed in a western direction under the chalk, to within 30 miles of Calais. Looking at these facts, and reasoning on theoretical considerations connected with the formation of coal in the West of Europe, Mr. Godwin Austen concluded that coal measures might possibly extend beneath the south-eastern part of England. He showed that the coal measures which thin out under the chalk near Therouanne probably set in again near Calais, and are prolonged in the line of the Thames Valley parallel with the North Downs, and continuing thence under the valley of the Kennet extend to the Bath and Bristol coal area. He showed, upon theoretical grounds, that the coal measures of a large portion of England, France, and Belgium were once continuous, and that the present coal fields were merely fragments of the great original deposit preserved in hollows. These views are supported by many eminent geologists who gave evidence before the Commission, but they have been controverted by Sir Roderick Murchison, who contends that in consequence of the extension of Silurian and Cambrian rocks beneath the secondary strata of the South-East of England, and of the great amount of denudation which the carboniferous rocks had undergone over the sea of the South of England previous to the deposition of the secondary formations, little coal could be expected to remain under the cretaceous rocks. Upon a general review of the whole subject Mr. Prestwich adopts, with slight variations, the views of Mr. Godwin Austen, and is led to the conclusion that there is the highest probability of a large area of productive coal measures existing under the secondary rocks of the South of England. He shows that the thickness of these overlying rocks is not likely to exceed 1000 to 1200 ft., and considers that there is reason to infer that the underground coal basins may have a length of 150 miles, with a breadth of two to eight miles—limits within which are confined the rich and valuable coal measures of Belgium. Mr. Prestwich shows that there are grounds for believing in the existence of coal on the south side of the Mendips, and under adjacent parts of the Bristol Channel; but at a depth of not less than 1500 to 2000 ft., and mentions also a small new coal basin in the Severn Valley, near New Passage. As the existence of coal under the unexplored area of the South of England is still a question of theory, no attempt has been made to estimate its quantity.

The aggregate quantity of coal which may be reasonably expected to be available for use is 146,480 millions tons.

Before proceeding to investigate the question of the duration of this quantity, based upon increasing consumption, we think it useful to state the relation which 146,480 millions of tons bears to our present consumption, estimated at 115 millions per annum, in order that the vast magnitude of our stores of coal may be better appreciated. Thus, we find that 146,480 millions of tons will support our present production for 1273 years; the same quantity would support an annual production of 146 millions for 1000 years; of 175 millions for 837 years; and of 230 millions, being double our present production, for 636 years.

The question of the duration of the total available quantity turns chiefly upon the statistics of consumption. In the year 1680 the coal produce of the United Kingdom appears to have been only about 2,250,000 tons, and 40 years later the increase was only 364,000 tons. Fifty years after this, or in 1750, the quantity raised in the kingdom had increased to nearly 5,000,000 tons. In 1800 the quantity exceeded 10,000,000 tons. About this period the system of canal navigation was rapidly extending, and the result was that coals were gradually finding their way into new districts, by which means the consumption of coal was greatly increased. In 1816 the production reached 16,000,000 tons according to one statement, and 27,000,000 as given with considerable probability by another.

Advancing to a later period, when coal statistics were more carefully collected, it appears that in 1854 the production of coal was 64,500,000 tons. From that period up to and including 1869 there was a nearly progressive increase to 107,299,634 tons, the consumption per head of population varying from 2¾ to 3⅝ tons. In attempting to form an opinion as to what the future consumption of coal is likely to be, it is necessary to consider the question which was referred to Committee B—"Whether there is reason to believe that coal is wasted by carelessness or neglect of proper appliances for its economical consumption?" The conclusion arrived at by this Committee was that "for some time past in our manufactures there have been constant and persevering efforts to economise coal, by the application of improved appliances for its consumption." The committee had reason to belive that "in some branches of manufacture the limits of a beneficial economy appeared to have been nearly reached, and that in other cases a gradual effort would continue to be made for saving fuel." It may be assumed, therefore, that the progress of economy in using coal is not likely to operate in future with greater effect in keeping down the increase of consumption than it has hitherto done.

The present consumption of coal for domestic use is generally estimated at 1 ton per head for the whole population, and may be assumed to absorb nearly one-third of the entire production. It is probable that this rate per head will continue pretty constant, because, although more economical methods of using coal in dwellings may probably be introduced, yet the increasing wealth of the nation will cause coal to be more liberally used for domestic purposes. The future increase of consumption under this head may, therefore, be expected to coincide with the increase of the population.

As regards the future exportation of coal, although a very large increase has taken place within the period embraced by the preceding table, yet there is reason to doubt whether much further increase will take place in this direction. Upon this point Committee E have reported that the probable development of the enormous coal fields of North America, and those of India, China, Japan, and other countries, and the more effective working of the known coal fields of Europe, will probably prevent any considerable increase in the future exportation of British coal.

The large increase which, in recent years, has taken place in the consumption of coal has an intimate connection with the introduction and extension of the railway system, but for several years past the progress of railways has not been exceptionally great, and yet the consumption of coal has continued to increase with unabated rapidity. From the year 1811 to 1821 the increase was 16 per cent., while in the last decade, from 1861 to 1871, it was 11¾ per cent.

According to Mr. Jevons' view, we should have to compute the increase from these causes at a permanent rate of 3 per cent. per annum, which would lead us apparently to impossible quantities. Mr. Price Williams differs from Mr. Jevons as to the constancy of the rate of increase. He thinks that the present rapid increase in the annual production of coal is mainly a consequence "of the equally rapid and abnormal development of our commercial activity, which has followed the introduction of steam-power in this country, and that the effect of this initial increase in the annual yield of coal is still perceptible, just as it is, in a minor degree, in the present rate of increase of our population." He further supposes the rate of increase of coal used per head of the population to follow a diminished ratio analogous to that shown by the curve of population. He has pointed out that the absolute increase of the consumption of coal for the four years from 1855 to 1859 averaged 0·035 tons per head per annum, that the next six years, 1859 to 1865, average 0·145 tons per head per annum, while the last four years, 1865 to 1869, only averaged 0·0463 tons per head per annum. He considers it evident, therefore, that during the entire period referred to the annual increase has passed through a point of maximum increase, and that it is now diminishing, with strong presumptive evidence that it will continue to diminish at the same or some other slower rate. Mr. Price Williams has furnished a table which shows that the annual consumption of coal at the end of 100 years would be 274 million tons. A further conclusion from this table is that the now estimated quantity of coal available for use would upon this view represent a consumption of 360 years.

It will, of course, be observed that, assuming the rate of increased consumption as above, there would be a nearly corresponding increase in the products of manufacturing industry, and the figures representing such an increase would raise questions as difficult and problematical as those raised by the assumption of a population of 131 million 360 years hence.

Upon this basis we arrive at the following results:—At the end of 100 years the consumption would be 415 million tons per annum, and the now estimated quantity of coal available for use would represent a consumption of 273 years.

There is yet another view, which may be regarded as the extreme opposite to that of Prof. Jevons. It is that from this time the population of the whole country, and the consumption of coal per head of that population, will remain constant, or merely oscillate without advancing. In this case our available coal would represent a consumption of upwards of 1273 years, at the rate of 115 millions of tons per annum.

DEEP COAL.—We shall now advert to the large amount of coal excluded from our previous estimates on the ground of excessive depth. The quantity of coal lying beneath the Permian and other newer strata at depths exceeding 4000 ft. is computed at upwards of 41,144 millions.

Estimate of Quantities of Coal at depths over 4000 feet beneath the Permian, New Red, and other Strata:—

Districts.	Square Miles.	From 4000 to 6000 feet.	From 6000 to 10,000 feet.	Total in tons.
Between Cannock Chase, Coalbrookdale, and the North Staffordshire Coal Field, under the New Red Marl, &c., of Eccleshall, Stafford, Breewood, and High Offley	112	3,346,022,400	—	3,346,022,400
Southern borders of the North Staffordshire Coal Field	75	2,240,640,000	—	2,240,640,000
Plains of Cheshire, between the Denbighshire and North Staffordshire Coal Fields	340	11,850,496,000	11,850,496,000	23,700,992,000
Southern borders of the Lancashire coal field, and the country around Manchester & Stockport.	208	6,904,490,667	3,452,245,333	10,356,736,000
The Wirrell, Mersey, and country to the north....	108?	1,500,000,000	—	1,500,000,000
	843	29,341,649,067	15,302,741,333	41,144,300,400

Of this quantity it will be seen that more than 29,000 millions of tons are assumed to lie at depths of between 4000 and 6000 ft., at which latter depth the temperature of the earth would be 150° Fahr. The remainder, amounting to more than 15,000 millions of tons, is assumed to lie at depths varying between 6000 and 10,000 ft., at which maximum depth the temperature of the earth would be 215° Fahr., or 3° above the temperature of boiling water at the sea level. To these quantities are to be added 7320 millions of tons returned as being at greater depths than 4000 ft. within the area of the known coal fields. Of this quantity probably 5922 millions of tons lie between the limits of 4000 and 6000 ft. in depth, and the remaining 1397 millions of tons between 6000 and 10,000 ft.

With these additions the total quantity of coal lying at depths exceeding 4000 ft. will be a little more than 48,465 millions of tons.

It is entirely a matter of conjecture whether any or what portion of this coal can ever be worked, but if we were to suppose the whole to become available we should have to make the following corrections in the number of years duration given above as the result of the different modes of viewing the question:—

1.—The 360 years deduced from Mr. Price Williams's table (No. 3) would be altered to 433 years.

2.—The 276 years based on an increasing consumption in arithmetical ratio will be altered to 324 years.

3.—The 1273 years computed on the supposition of non-increasing consumption would be altered to 1695 years.

Whatever view may be taken of the question of duration of coal the results will be subject to contingencies, which cannot in any degree be foreseen. On the one hand, the rate of consumption may be thrown back to any extent by adverse causes affecting our national prosperity; and, on the other hand, new discoveries and developments of new directions may arise to produce a contrary effect upon the consumption of coal. Every hypothesis must be speculative, but it is certain that if the present rate of increase in the consumption of coal be indefinitely continued, even in an approximate degree, the progress towards the exhaustion of our coal will be very rapid.

In all the foregoing estimates of duration we have for the sake of simplicity excluded from view the impossibility of supposing that the production of coal could continue in full operation until the last remnant was used, and then suddenly cease. In reality a period of scarcity and dearness would first be reached. This would diminish consumption, and prolong duration, but only by checking the prosperity of the country.

The absolute exhaustion of coal is a stage which will, probably, never be reached. In the natural order of events the best and most accessible coal is that which is the first to be worked, and nearly all the coal which has hitherto been raised in this country has been taken from the most valuable seams, many of which have in consequence suffered great diminution. Vast deposits of excellent and highly available coal still remain, but a preference will continue to be given to the best and cheapest beds, and as we approach exhaustion the country will by slow degrees lose the advantageous position it now enjoys in regard to its coal supply. Much of the coal included in the returns could never be worked except under conditions of scarcity and high price. A time must even be anticipated when it will be more economical to import part of our coal than to raise the whole of it from our residual coal beds, and before complete exhaustion is reached the importation of coal will become the rule, and not the exception, of our practice. Other countries would, undoubtedly, be in a position to supply our deficiencies, for North America alone possesses tracts of coal-bearing strata as yet almost untouched of 70 times the area of our own. But it may well be doubted whether the manufacturing supremacy of this kingdom can be maintained after the importation of coal has become a necessity.

Mr. George Elliot agrees with the rest of the Commissioners as to their report, except as to the introduction of that part of the calculation by Professor Jevons, which seems to imply the possibility of the exhaustion of our coal in 110 years.

Although Sir Roderick Murchison agrees with his brother Commissioners as to the greater portion of the preceding report, he records his earnest protest against the statement made upon the probable existence of coal fields under the Cretaceous and other Secondary rocks in the South of England.

That view being purely theoretical is, in his opinion, distinctly controverted by the evidence of physical data all around the area in question, whether in England or France.

For, wherever rocks of carboniferous or older date are there found in contact with younger deposits such older rocks are everywhere unproductive of coal.

He is, therefore, of opinion (and many well-known practical mining geologists with him) that the existence of any productive coal fields in the south-eastern counties of England is in the highest degree improbable.

COLLIERY INSPECTION IN AMERICA.

The State Mine Inspector for the Wilkesbarre district (Mr. T. M. Williams) appears to be exerting himself to his utmost to secure the enforcement of the safety laws referring to collieries. The Inspector has obtained convictions before the Hon. Judge Hardinge against the owners and managers of a colliery in Luzerne county for having no second outlet, no metal speaking-tube, an insufficient cover to the cage, and no suitable brake to the drum. The Court continued the injunction issued at the commencement of the action to prevent the defendants from working the colliery. In connection with his duties, Mr. Williams has likewise issued the following long series of questions, with reference to the Act, to all persons in charge of mines in his district, to elicit answers that will enable him readily to determine the safety or otherwise of any mine under his charge:—

1.—Have you maps, as required?

2.—Have you two or more openings at all times available for ingress and egress of the men?

3.—Have you sufficient cover over carriage? (If shaft.)

4.—Have you a spreader chain on crosshead?

5.—Have you safety-catches, and have you proved them to be good?

6.—Have you an adequate brake on hoisting machine, whereby persons are hoisted out of the mine?

7.—Have you any boy or boys under 12 years of age working inside?

8.—Have you commenced driving for a second opening, as required by law?

9.—Have you a house for men to change in, as required by law?

10.—Have you the necessary amount of ventilation required?

11.—Is it circulated as required in spilts, and travel the face of each work place?

12.—Have you any standing gas?

13.—Have you furnaces at work where there is a breaker over shaft?

14.—Have you the airways as large, as required by law?

15.—Have you metal tube?

16.—Have you a practical and competent man as mining boss, to put into operation the new mining law in all its requirements?

17.—Have you any person looking after the air courses and fire-damp as fire boss?

18.—Has the amount of air at face of each gangway been measured at least once a week, as required by law, and report monthly?

19.—Is there any danger from old standing stock of gas or water; if so, do you bore ahead, as required?

20.—Have you any but experienced, competent, sober engineers, whereby men are under their care?

21.—Do you allow men to ride upon any loaded car or cage, or more than 10 men at one time on any wagon?

22.—Do you understand your duty in case of any serious accident or death of one of your men?

23.—Have you complied in having your boilers examined every six months, and oftener if needed, by competent men, and made report thereof?

24.—Have you all the machinery in and about your breakers fenced off, so that boys may be kept from unnecessary danger?

25.—Have you gates to fence off all working as well as all old shafts and slopes, so as to prevent man or beast from falling in?

26.—Do you fully understand the meaning of the Mining Act of 1870, the many penalties it imposes for neglect and failure to comply; and further, the right of action by the legal heirs of any person that may lose their lives thereby, as provided in Section 24?

SIR,—I hereby notify you to comply with all the requirements of the mining law, passed and approved the 3rd day of March 1870, and especially in everything that is herein marked deficient, or consider yourself open and subject to the operations of the law itself, as provided for in many sections, but particularly in sections 5 and 24. T. M. WILLIAMS, Inspector of Coal Mines.

TESTING OF COLLIERY SAFETY-LAMPS.

A series of experiments of a highly important character, and which for some time past have been looked forward to with considerable interest by colliery owners of Yorkshire and Lancashire, as well as those in other districts, took place, a few days since, at the Oaks Colliery, near Barnsley, in the presence of a large number of mining engineers and others, the object being to test in particular the lamp patented by Mr. Teale, of Manchester, with a view to showing what advantages it had over the Stephenson and other lamps in use. The lamp of Mr. Teale, it was stated, was now used in upwards of 160 collieries in different parts of the kingdom, in each of which an interest was felt with regard to the result of the experiments. Amongst those present were Mr. T. Dymond, principal proprietor of the Oaks Colliery; Mr. Clarbour, and Mr. Teale, Manchester; Councillor Lawrence, Barnsley; Mr. Wilson, Darfield Main Colliery; Mr. Patteson, Donaby Main; Mr. Beacher, Lund Hill; Mr. J. Carr, Barnsley; Mr. Minto and Mr. J. Beaumont, Monk Bretton Colliery; Mr. Ward, the Oaks; Mr. Lawton, Old Silkstone Collieries; Mr. Miller, Strafford Main; Mr. R. Day, Mr. H. Smith, Old Mill, &c. The patent lamp burns a volatile spirit called colzaline, and the air is supplied either by holes at the bottom or sides. About eight lamps were brought for the purpose of testing, each of which was minutely examined and tried by Mr. Wilson before being taken into the pit. After descending the party assembled in the place formerly used as the lamp cabin, but known after the great explosion as the "Box hole," and we found ourselves for the second time sitting quite close to the spot where the remains of Mr. Parkin Jeffcock were discovered, and to whose memory the foundation stone of a memorial church was laid at Mortomley, near Sheffield, on Monday last.

Proceeding to the main air-way, about 150 yards from the bottom of the shaft, by means of the anemometer the current was measured, and found to be passing at the rate of 16,000 cubic feet per minute, the thermometer registering 69½°, the road being about 5 ft. 6 in. by 5 ft. Eight lamps were then hung—six of them Mr. Teale's and two Stephenson's—on to a stick in the centre of the air-course. All of them appeared to be highly sensitive, more especially the patent ones:—

No. 1 *Lamp.*—Ordinary patent, without recent improvements. Flame moderate, but rather unsteady and flickering.

No. 2.—Holes in the bottom for the air, similar to No. 1. Light rather regular.

No. 3.—Four holes in the bottom. Light unsteady.

No. 4.—Small side holes for the ventilation. Steady flame and brilliant light.

No. 5.—Ventilated from the bottom of the gauze, with the glass raised about the third of an inch. Good and steady light.

Nos. 6 *and* 7.—Stephenson's oil lamps. Gave a steady but not such a brilliant light as the others. Patent.

No. 8.—Patent. Holes in the sides. Steady, good light. The best of Mr. Teale's, and in every way satisfactory.

The next test was that by concussion, or the closing of doors, in connection with the air which fed with life 350 men and boys. The lamps stood the test well, the rush of the air after the doors were banged together being similar to the roar of the sea as heard at a distance. The lamps were again tested in a leading bank in the dip of the new plane in the old pit, with very satisfactory results. In a still atmosphere they also gave a steady, clear, and bright light. Passing from the old pit to the new one, we came to what was formerly known as Thompson's box-hole (and in the neighbourhood of which, no doubt, many bodies still remain), reaching Dyson's bord, where the pits are connected. From there to the bottom of the new pit the party journeyed, several of them tired and weary, seeing that from one shaft to the other would be fully a mile and a quarter, care being necessary to protect the head from the roof, each individual having to look out for himself. A short distance from the new pit bottom the lamps were tried by a powerful test—the effect produced during the firing of a shot. About 25 yards from the point where the shot was fired the lamps were held and observed. On the shot going off the lamps flickered for about a second, and then recovered their original brilliancy. The party then ascended, after having been down between four and five hours, by no means, however, improved in personal appearance by the visit to the workings of the Oaks, but all well satisfied with the results of the experiments. In talking over the matter in the office, after getting rid of as much slack from the face and hands as a supply of water could accomplish, Mr. Wilson said the lamps had been well tested, and he considered the results most satisfactory. Mr. Dymond said perhaps it would be advisable for the lamps to be used in a pit for some time, and the results gained by such experience made known.

The company then proceeded to the Royal Hotel, Barnsley, where a choice and excellent dinner was provided by Mr. Marsden. The chair was occupied by Mr. Clarbour (joint patentee with Mr. Teale, who was unable to preside owing to an accident), and Mr. T. Dymond the vice-chair. After the usual loyal toasts had been disposed of the Chairman proposed the health of Mr. Dymond, and in doing so expressed the thanks of himself and Mr. Teale to that

gentleman, for having afforded them the facilities for testing the lamps in the Oaks Colliery.

Mr. DYMOND said it afforded him great pleasure to assist in any way in the introduction of any invention calculated to give increased safety to those engaged in mining pursuits, and he hoped that Mr. Teale's lamp would prove to be a step in that direction. The lamp would be entrusted to experienced men in the pit, and it would be for them to say what real benefit was to be gained by its adoption. Experience was always a good test, and he hoped that Mr. Teale would give them the best lamp it was possible to find.

Mr. MINTO remarked that he had been much pleased with the lamp not only that day, but from what he had seen before of it. Independent of the question of cost the lamp was a really good one, and according to the tests of Mr. Wilson it would hold its own with any other lamp in use.

Mr. TEALE said the tests that day had been suggested by gentlemen connected with mining in South Yorkshire, and he had to thank them for the courtesy he had received at their hands. If the lamp was not a good one, then the sooner such was made evident the better, but if it was really good then Barnsley would have the credit of having conduced to make its merits generally known. They were at present used in about 160 collieries in different parts of the kingdom, and he courted the fullest enquiry as to their advantages over the ordinary lamps in use. His object had been to produce a better lamp, showing a greater light, with increased safety, than those at present used.

Mr. BEACHER then read from his notes the results of the testing (as previously given). He considered the lamp with holes at the side the one *par excellence*. It gave a strong and steady light, being very sensitive; indeed, it was almost too good, for whilst it was all right when in clear air, yet in contact with carbonic acid gas the light was at once put out. Another point in its favour was that it could not be tampered with, for the moment this was attempted the light went out.

Mr. TEALE, in answer to Mr. Dymond, said the lamp would stand any amount of knocking about.—Mr. WARD, speaking from 27 years' experience in coal mines, considered the lamp superior to all others—it gave a better and brighter light than the Stephenson or any other lamp, there was no crozzel, and no lessening of the light until the spirit was exhausted. When the lamp was hung up—as it ought to be, for he never allowed a lamp to be placed on the floor, and compelled trammers to carry them on their thumbs—it burnt steadily and bright. He suggested that there should be an extra rim at the bevil to protect the screw.

Mr. BEACHER suggested that a more elaborate series of experiments should be made, although those he had seen that day were in every way satisfactory.

Mr. WILSON said it was not so much a question of economy they had to look at as of safety. What the miners wanted was a lamp giving more light than those now used with the same amount of safety at least. There was scarcely any safety-lamp but what had some fault; the Stephenson was good, but the light was not sufficient; with a better light the men would earn more money, and the masters yet a better quality of coal. The ordeal the lamp of Mr. Teale had been put through was a trying one, and the results to him (Mr. Wilson) were in every way satisfactory.

Mr. BEACHER, so far as his experience went, said the lamp appeared to be all that could be desired.

Mr. WILSON said they had tested the lamps with regard to the concussion caused by the closing of doors, and the results were satisfactory. He would be most happy to aid again in testing the lamps in every possible way, if that should be considered necessary.

Mr. BEAUMONT was perfectly satisfied that the colzaline lamp of Mr. Teale has a better and a safer light than the oil ones, whilst it required no snuffing, and there was no possibility of oil getting on the gauze.

Mr. PATTESON was highly satisfied with the experiments he had seen that day. In his opinion the patent lamp was as safe as the Stephenson, and more economical, and there was consequently an advantage in using it. In the concussion caused by the shot, he did not think there was much difference in the effect between the patent and the Stephenson lamp.

Mr. LAWTON expressed himself much pleased with the results of testing the lamp of Mr. Teale, which he considered to be a very good one indeed.

Mr. MILLER said he concurred with the remarks made by the previous speakers as to the value of the lamp. As the lamp was as safe and more economical than those in use, he should like to know whether the colzaline could not be put in an ordinary Stephenson?

Mr. TEALE said the Stephenson would not burn the colzaline.

Counsellor LOWRANCE expressed himself much pleased with the experiments he had seen in the pit, and considered it of the greatest importance that colliery proprietors should get the best possible lamp, ensuring not only a good light but increased safety.

Mr. MINTO, in answer to a question, said that the colzaline consumed by the patent lamp in a certain time cost 2d., whilst oil for the same period would cost 6d. in the ordinary lamp, so that there was a marked saving in that respect.

Several other toasts, including "The Press," were given and responded to, and the merits of the colzaline lamp were discussed up to a late hour, all agreeing that it was superior to the Stephenson or any other now in use.

ON EXPLOSIVE AGENTS.

At the British Association, Professor ABEL, of the Royal Arsenal, Woolwich, delivered a lecture, "On Recent Investigations and Applications of Explosive Agents." In the opening of his lecture the Professor said he could not attempt to give much more than an outline of the nature and results of the important investigations which had been instituted, and were still being pursued, relating to the development and regulation of the explosive force of gunpowder, and to the application of some other explosive materials which were already supplanting gunpowder in some of its important uses. The manufacture of gunpowder, required for war purposes, was carried on here and abroad very many years without any important modification. The system pursued in this country in mixing or incorporating the ingredients, and in converting the mixture into granulated gunpowder, of sufficient density and hardness to enable it to resist injury by transport and stowage in all climates, furnished a product which was greatly superior to the generality of foreign gunpowders in regard to its keeping qualities, but which was also more violent in its action; because, in fact, the conditions essential to a rapid and complete transformation of the several constituents were more thoroughly fulfilled in its manufacture, and which hence earned on the Continent the name of "*poudre brutale*." The comparatively small charges used even with the heaviest cast-iron smooth-bore guns, which until recently constituted the most powerful part of our armaments by sea and land, were, however, regarded in this country as not unduly trying to the endurance of those guns; and although, about fourteen years ago, some attention was directed to the question of modifying the form or proportions of heavy guns, with a view to increase their durability, in consequence mainly of some very instructive experiments instituted in America by Major Rodman, it was not until some little time after the first great stride was made in the increase of power of our armaments (by the introduction of the 110-pounder Armstrong rifled wrought-iron gun), that attention became seriously directed to the importance of attempting to reduce the violence of action, or rapidity of explosion, of the gunpowder to be employed in the increased charges required to impart the requisite velocity and accuracy of flight to comparatively heavy projectiles. In 1858, a small committee was appointed to determine upon the best description of gunpowder to be used in the Enfield rifle, and not long afterwards this committee was instructed to extend its enquiry to cannon powder—the most powerful gun of the service at that time being the 100-pounder Armstrong gun. The committee instituted a series of experiments, which resulted, in the first instance, in the introduction into the service, in 1860, of the so-called rifle large-grain powder for all rifled guns, and subsequently to the provisional introduction, in 1864, of pellet-powder for the heavier natures of ordnance. In America, experiments on gunpowder were vigorously pursued at the same time as they were being slowly carried on, with comparatively imperfect means, in England, and the particular form of powder known as prismatic, the production of which was developed in Russia a few years ago, and which has been to some extent adopted in Prussia, appeared to have been of American origin, though it had not found favour in that country, where a gunpowder similar in form and size to powder known as pebble was employed in guns of large calibre, under the name of mammoth powder.

The principles laid down by the first Committee on Gunpowder in 1858 as their guide in attempting to reduce the violence of action of powder when fired in large charges had been up to the present time adhered to by those since entrusted with the continuance of these investigations. The explosive action of gunpowder was susceptible of very extensive modification by the variation of its composition; but inasmuch as the force exerted by gunpowder was due not simply to the actual amount of gaseous products resulting from the explosion, but also, and in the largest proportion to the heat developed by the chemical action, it followed that there must be a particular proportion of ingredients which, leaving other conditions out of consideration, would appear the best, as furnishing the largest amount of gaseous matter compatible with the development of the highest temperature. There could be no doubt that the proportions of saltpetre, sulphur, and carbon employed in the early days of gunpowder manufacture (and which had hitherto undergone no very considerable modification, and indeed not made with any definite design) were not fixed upon by any theoretical considerations, but were purely the result of tentative experiments, but they very nearly corresponded to those required for the development of the most energetic action of the saltpetre upon the carbon (regarding the charcoal for a time as pure carbon), though they were not calculated to furnish the largest amount of gas from a given weight of the mixture. The latter result would necessitate the employment of the carbon in the proportion to produce carbon monoxide, or carbonic oxide, while the amount actually used in gunpowder was approximately that required to produce only carbon dioxide or carbonic acid, assuming the sulphur only to exercise the function above indicate, and not to take to itself any of the oxygen of the saltpetre. It had now been long established that the sulphur did at any rate undergo partial oxidation, but it was also admitted that the employment of the proportions of saltpetre, carbon, and sulphur indicated by the old theory which provided for the full oxidation, or conversion into carbonic acid, of the greater part of the carbon, furnished a mixture by the combination of which a comparatively very great amount of chemical energy, and, consequently, of heat, was developed, or of pressure when the charge was confined.

It was upon such considerations as these that the late Committee on Gunpowder came to the conclusion that, in attempting to moderate the explosive violence of gunpowder when used in large charges it was unadvisable to make any change in the established composition of gunpowder which might be productive of a diminution of the total pressure developed by a charge, unless the desired results were unattainable by modifying the mechanical and physical characters of powder—in other words, by introducing changes in the preparation of gunpowder, and in the form in which it is employed. Experience had shown that it required a very careful adjustment of the several mechanical and physical characters of gunpowder to reduce the rapidity of its action, and at the same time to develope the requisite total pressure, and consequent velocity, with sufficient uniformity. The first prominent results obtained by the late Committee on Gunpowder were simply arrived at by increasing the size of the masses composing the charge, subsequently it was found that the results were greatly improved by paying attention to the density and hardness of the powder, and by adopting measures to promote uniformity in regard to these properties of the powder, particles composing a charge, the importance of which had become more evident as the means available for examining the action of fired gunpowder had been extended and perfected. After referring to the earlier experiments with regard to the pressure developed by exploding gunpowder, Prof. Abel mentioned some very interesting experiments which were instituted in the United States in 1857, 1858, and 1859 by Major Rodman, who registered the pressures exerted in a gun on the explosion of a charge by means of an ingenious instrument, well known as Rodman's Pressure Piston, which had since been extensively employed in similar experiments in France, Prussia, and other countries. In 1869 the present Committee on Explosive Substances were entrusted by Government with the investigation of the action of gunpowder, which had been taken up by the late Ordnance Select Committee in continuation of the Gunpowder Committee's experiments, the special object of the researches being to ascertain the pressures exercised in guns of different calibres by different descriptions of powders, and to deduce from the results the conditions to be fulfilled by a powder susceptible of safe and efficient employment in very large charges. In their earlier experiments the committee employed Rodman's pressure gauge as one method of registering the pressure developed, and afterwards a chronoscope, devised and elaborated by Capt. A. Noble, by means of which they had been enabled to determine with ease and precision the time occupied by the projectile in traversing different parts of the bore of a gun. With the aid of this instrument, and the crusher-gauge employed simultaneously with it, the Committee on Explosives had compared the action in the gun of the powders hitherto used in the service with several gunpowders of foreign manufacture, and particularly with certain descriptions of powder which had been specially manufactured for employment in large charges. Guided by the results obtained, they had succeeded in producing a description of powder (known as "pebble powder"), the physical and mechanical characters of which had been so adjusted with reference to one another that the capabilities of large guns had become more thoroughly developed, and their powers of endurance at the same time much less severely tried by its employment than by that of any other descriptions of gunpowder which had been specially devised with those objects in view during the last four years. A comparison of the results arrived at by means of the chronoscope and a 10-in. gun, with the powder hitherto used in all rifled cannon, known as R.L.G. powder with the Russian prismatic powder (which for a time was regarded as superior to all other varieties), and with the pebble powder, at once demonstrated the superiority of the latter. By the employment of pebble or pellet powder, as now manufactured, not only was the strain upon the guns up to that of 25 tons greatly reduced when velocities equal to those furnished by the R.L.G. powder were attained, but they are, moreover, enabled to obtain from these guns very considerably increased effects without submitting them to a greater strain than they would be exposed to in employing the former service power to obtain the standard results. But in passing from the 25-ton gun to that of 35 tons, which was designed for a 700-lb. projectile, and a very much heavier powder charge than had hitherto been used, the satisfactory results furnished by the new powders in other guns were less readily attainable, and it was still uncertain whether—and if so, in what way—further modifications in the manufacture would have to be introduced to meet the requirements of the largest guns.

The more searchingly the nature of the action of fired gunpowder was investigated, and the more the methods of investigation were varied, the sooner, and the more readily and completely, might they hope to fulfil those conditions in its manufacture which would thoroughly establish its efficiency when applied to ordnance of all calibres. The subject was at present receiving in several quarters the careful study and practical investigation which it merited. Although gunpowder was still the only propelling agent susceptible of general application, it no longer enjoyed a monopoly in connection with some equally important applications to naval, military, and industrial purposes. The very energetic action of potassium-chlorate upon readily oxidisable substances, and the great rapidity and violence of explosion of mixtures of that class, when compared with similar mixtures containing saltpetre, had given rise for many years past to repeated attempts, often renewed in the same directions, to apply that substance to the production of powerful substitutes for gunpowder. Mixtures of it with resin, powdered nut-galls, and other substances of vegetable nature or origin, have been suggested, and in some instances applied to a limited extent in directions where rapidity and violence of explosive action appeared to present advantages, as in some kinds of blasting operations; even the old and well-known mixtures of the chlorate with potassium ferro and ferri-cyanide and sugar, which for many years past had been described in chemical handbooks as white gunpowder, and German gunpowder, has been more than once re-proposed of late, not merely as mining agents, but for use in fire-arms. The practical objection generally raised, and with reason, against mixtures of that class, that they were of detonating character, and consequently more or less dangerous to transport or handle, was always either met or forestalled by the proposal to keep the ingredients separate until the mixture was actually used, as the violent oxidising property of potassium-chlorate rendered the production of powerfully explosive preparations possible by crude and rapidly performed mixing operations, which would be altogether inadequate for the production of useful explosive mixtures with saltpetre. Such a proceeding was, however, inadmissible in naval and military service for several reasons; and the trouble which it would involve at the hands of miners using such preparations would probably always lead them to forego any advantages which might result from their employment, and either to adhere to gunpowder, or to employ other materials supplied in the form in which they were actually to be used, even though considerable risk of accident might be incurred with these. Some of the preparations of this class, which, disguised by fancy names, occasionally found their way into miners' hands, were of so dangerous a character that it amounted to little short of deliberate criminality to endeavour to find a sale for such materials. The discovery of a more violent explosive agent than gunpowder, which might be employed as a charge for shells without any risk of accidental explosion resulting from the concussion to which they were exposed when the gun was fired, had been considered a desideratum for some years past. A few experiments were made by the late Committee on Gun-cotton upon the employment of that substance in shells, and spherical shells were safely fired from a mortar of 13-in. calibre, but disastrous results were obtained when this material was used as the charge of lead-coated and studded elongated projectiles fired from rifled guns. A few were safely fired, but without any apparent alteration of conditions; others burst in the gun, and instead of simply indenting and scoring the bore, as would have been the case if a shell charged with powder had burst prematurely, one gun was rendered perfectly unserviceable by the violence of the explosion, and another was burst, the fragments being projected many hundred yards. Further systematic experiments have been continued for Government from time to time, with the view of discovering a safe and powerful explosive agent for shells. The lecturer then detailed various experiments which had been made with different explosive substances, particularly with nitro-glycerine and with the mixture of nitro-glycerine and siliceous earth known as dynamite, and stated that, notwithstanding the promising results obtained from these experiments, it was deemed advisable to seek for some other explosive agent than a nitro-glycerine preparation as the material for shell-charges, for two reasons—firstly, because the well-grounded confidence in the safety of nitro-glycerine and its preparation, essential to their employment in naval and military service, did not yet exist; and, secondly, because the explosive force of these preparations, as illustrated by the one experimented with, appeared considerably to exceed that required in connection with the most general application of shells. Eventually one of the salts of trinitrophenic acid or picric acid was found to furnish an explosive mixture which, as far as experiments have been carried, had proved to possess all the essential qualifications of a material applicable in the service as "shell powder." The safety of this substance was considered sufficiently established to warrant the institution of thorough trials of its powers as an explosive agent for shells. It was quite equal in permanence to gunpowder, and as water might be used in incorporating the ingredient without any detriment to the stability of the mixture, its preparation was, at any rate, not more dangerous than the manufacture of gunpowder, and it might be safely submitted to the pressing and granulating processes which were applied to the latter. As, moreover, the cost of picric powder, as compared to its power, was not considerable, this explosive agent was now recognised as susceptible of advantageous application to service purposes, provided its sufficient superiority over powder in regard to violence of action was satisfactoritorily established. There was good reason, however, to believe that, as regards naval and military uses, the picric powder was hardly likely to offer special advantages, except as a safe material for use in shells.

The lecturer next referred to the use of gun-cotton as an explosive agent, and said that numerous experiments, on a considerable scale, had been made with a view to thoroughly test the safety of compressed gun-cotton. Deal boxes, filled with the material in the ordinary way in which it is stored, and securely closed, had been arranged in piles, and the contents of a box in the centre of the pile had been ignited by means of a fuse. In another experiment one of the inner boxes of a pile had been surrounded by highly combustible material, and the latter inflamed, so as to envelope the box in fire. In all instances the contents of the one box had ultimately burned, but without even shattering the latter, and the large volume of flame produced for a few moments sometimes penetrated to the interior of another box in the heap, causing its contents to inflame in like manner, but in no instance was an explosion produced. Those boxes the contents of which were intact were removed from the pile without incurring any danger, although the inflamed boxes were still burning. Closed boxes, filled with compressed gun-cotton, have been fired at with a Martini-Henry rifle from a distance of 100 yards; in some instances the box and contents were perforated by the bullet without igniting the gun-cotton; in other instances the contents were inflamed, but no explosion occurred. Numerous other practical proofs have been obtained of the safety of compressed gun-cotton as compared with gunpowder, and with gun-cotton in the comparatively loose and open condition. The necessity for confining gunpowder and other explosive materials in strong receptacles, for the purpose of developing their explosive force, was greatly reduced, and was, indeed, entirely dispensed with in the case of charges fired under water, when detonating fuses were used as the exploding agents. Thus, if a quantity of gunpowder which, when enclosed in a strong iron receptacle, will be completely exploded, producing a particular destructive effect when fired in the ordinary way, was confined in a thin glass vessel, or in a bag of waterproof material, the receptacle would be burst open upon the first ignition of the charge, and a large amount of the powder would be dispersed in the water; but if a detonating fuse be employed to fire the charge contained in the thin envelope, the powder would be completely exploded, the destructive effect produced being at least as great as that of the charge fired in the strong vessel by the ordinary method. This result was of very great importance, because, in employing submerged charges of gunpowder or other explosive agents for purposes of demolition, or as submarine mines for war purposes, it was no longer necessary to use very strong and cumbrous receptacles for the purpose of obtaining the desired result; their strength need only be sufficient to ensure the perfect exclusion by them of water from the charge at the depth of immersion at which it has been employed. Masses of hard material, of great size and strength, such as blocks of hard rock, large iron castings, or thick bars of wrought-iron, might be broken up by simply placing upon one of their surfaces a comparatively small charge, quite unconfined, of compressed gun-cotton, or of a nitro-glycerine preparation, and exploding it by means of a detonating fuse. The demolition of stockades, bridges, and other structures, which it might be desirable to destroy or render useless as expeditiously as possible in the course of military operations, might also be effected with much greater ease, rapidity, and certainty by the aid of detonation than by the old method of operation; and the ease and safety with which compressed gun-cotton might be applied to these purposes has been demonstrated by numerous experiments instituted by the Royal Engineers. In conclusion, the lecturer remarked that, although in the sketch he had given of the recent progress which had been made in the application of explosive substances, many points of interest and importance had unavoidably been passed over, still sufficient had been said to show not only that the production and utilisation of these powerful agents of destruction, and these indispensable auxiliaries in the development of industrial resources, had been advanced in an unprecedented manner within the last few years, but also that very much remains to be learned regarding their nature and operation, and the conditions to be fulfilled in their most efficient application in many important directions. The lecture was illustrated throughout by numerous interesting experiments.

UNDERGROUND TEMPERATURE.

In a paper on this subject, read at the British Association, Prof. J. D. EVERETT said the intended boring at the bottom of Rosebridge Colliery had not been executed, recent occurrences in a neighbouring pit having given the manager reason to fear an irruption of water in the event of such a boring being made. Careful observations of temperature have been taken by the engineers of the Alpine tunnel under Mont Frejus (commonly called the Mont Cenis tunnel). The highest temperature in the rocks excavated was found directly under the crest of the mountain, which is quite a mile overhead. This temperature was 85·1° Fahr., the mean annual temperature of the crest over it was estimated, from comparison with observed temperatures at both higher and lower levels (San Theodule and Turin), at 27·3° Fahr. Assuming this estimate to be correct, the increase of temperature downwards is at the rate of 1° in 93 ft., which, by applying a conjectural correction for the convexity of the surface is reduced to about 1° in 81 ft., as the corresponding rate under a level surface. This is about the rate at Dukinfield Colliery, and is much slower than the average rate observed elsewhere. The rocks are extremely uniform, highly metamorphosed, and inclined at a steep angle. They contain silica as a very large ingredient. They are not faulted to

any great extent, and are very free from water. It is proposed to sink two bores, to the depth of from 50 to 100 feet at the summit and another point of the surface over the tunnel, with the view of removing the uncertainty which at present exists as to the surface temperature. Mr. G. J. Symons has repeated his observations at every fiftieth foot of depth in the water of the Kentish Town well, between the depth of 350 and 1100 ft., the surface of the water being at the depth of about 210 ft. The observations which have been repeated are thus completely free from the disturbing effect of seasonal changes.

The results obtained agree closely with those previously found, and show between these depths a rate of 1° in 54 feet, which, from the estimated mean temperature of the surface of the ground, appears to be also very approximately the mean rate for the whole 1100 ft. The soil from 325 to 910 ft. of depth consists mainly of chalk and marl, and shows a mean rate of 1° in 56 ft. From 910 to 1100 ft. it consists of sandy marl, sand, and clay, and shows a mean increase of 1° in 84 ft. The former of these is in remarkably close agreement with very trustworthy determinations made by Walferden, from observations in the chalk of the Paris basin. These are as follows:—Puits de Grenelle, Paris, depth 400 metres, rate 1° Fahr. in 56·9 ft.: well at Military School, Paris, depth 172 metres, rate 1° Fahr. in 56·2 ft.: well at St. André, 50 miles west of Paris, depth 263 metres, rate 1° Fahr. in 56·4 feet. General Helmersen, of the Mining College, St. Petersburg, informs the secretary that in sinking a well to the depth of 540 feet at Yakoutsk, in Siberia, the soil was found to be frozen, probably to a depth of 700 ft. The rate of increase from 100 ft. to 540 ft. was 1° Fahr. in 52 ft. A new pattern of thermometer has recently been constructed for the committee, which promises to be of great service. It is a maximum thermometer, on Negretti's principle, adapted to be used in a vertical position, with the bulb at the top. The contraction in the neck prevents mercury from passing into the stem when the instrument receives moderate concussions. Before taking a reading, the instrument must be gently inclined, so as to allow all the mercury in the stem to run together into one column near the neck. On restoring the thermometer to the erect position, the united column will flow to the other end of the tube (that is, the end furthest from the bulb), and it is from this end that the gradations begin. It is set for a fresh observation by holding it in the inverted position and tapping it on the palm of the hand. This instrument, like that heretofore used by the committee, is protected against pressure by an outer case of glass, hermetically sealed.

THE PATENT LAWS.

THE VENTILATION OF ICE SAFES.

The great and increasing interest which now attaches to the consideration of Patent Law Reform, and the glaring abuses which are constantly revealing themselves in the operation of the Act of 1852, invest with peculiar interest any passing illustration of the working of this somewhat obstructive and unsatisfactory piece of legislation. Whatever may be affirmed to the contrary by acute and speculative lawyers, or by self-seeking and appropriative manufacturers, it is a manifest and undeniable fact with the majority of logical thinkers that, in order to preserve and maintain the prestige of this country in the great race of international improvement, the true stimulus of invention must be preserved intact; and the reward which invariably associates itself in the mind with a substantive and successful advance in any department of the arts or manufactures must be held sacred, must be assured to the inventor as far as possible by proper legal provision, as a nominal concession from the Crown if you please, but more truly as a well-merited consideration, to be held during a certain term of years, for a public benefit rendered to the State. On the other hand, it is as imperatively demanded that all mere pretended inventions and false claims shall be quickly and ruthlessly laid bare and exploded, to the great advantage of the community at large. Indeed, I earnestly hope that whatever reforms there may be presently introduced into the law of patents some stringent clause will be embodied therein, which shall effectually prevent the institution of Chancery proceedings in the absence of any solid or certified ground of action, for in these days it not unfrequently happens that a patentee who has nothing really meritorious in his own invention will seize upon some useful and pertinent contrivance whose antiquity is not generally known, and laying public claim to it will, by the aid of lucre and assurance combined, seek to enforce his claim thereto by putting all opposing trade competitors into Chancery. Surely for the benefit of the fair trader, and for the release of industry from spurious imposts, some powerful legislative enactment is loudly called for, which shall facilitate the recovery of heavy damages against these piratical pretenders for all the trouble, anxiety, expense, and interruption which they thus so wantonly inflict upon perfectly innocent parties. Let it be understood that these remarks are quite general in their tendency, and refer to no one person in particular. The following case, of course, must stand upon its own merits, and is left entirely to the judgment of the reader.

Among the many introductions of modern domestic luxury, the Ice Safe holds a conspicuous position. It exists under a variety of modifications, and has been the subject of many patents. But whatever may be the special character of any particular invention, there are certain fixed and general principles which demand attention throughout all. For instance, it is known that when fish or flesh has been once frozen, its decomposition is much expedited by after exposure to ordinary temperatures. Provision is, consequently, made in every such safe that the contents shall never be lowered down to the freezing point. Then, again, every care must be taken to maintain the enclosed air in a dry state, and to prevent the various articles of food from being tainted with the flavour or odour of others placed in the same safe. There is, besides, another essential condition, which will be referred to directly. Glancing now, for a moment, at the labours of Mr. G. Keith, the Wenham Lake Ice Company, the Piston Freezing Machine Company, Messrs. Benhams and Froud, the well-known wholesale braziers, Mr. Chavasse, and a few others in London and the provinces, who, in this country, have mainly brought the invention to its present excellence, we come to the period of the French Exhibition of 1867, which caused an increased amount of attention to be directed to the subject; and in 1868 Mr. Kent invented and obtained a patent for what he denominates a New Ventilating Ice Safe. I have examined these new safes carefully, and I consider them fair average specimens of ordinary ice safes, such as are to be found, with slight modifications, in many other of the shops and factories of London; but for anything else—for anything beyond this, I suspect they are only about on a par with many other so-called "inventions."

But, at all events, Mr. Kent gives his customers and the public generally something which is really and unquestionably novel, for he tells them—and, what is more, he appears to believe it—that his patent safes embody in their manufacture, for the first time since the creation of the world, the great principle of ventilation so necessary to the effective preservation of animal, piscatorial, and vegetable food, and that he is the first and true inventor thereof. The public believed and marvelled. The trade did not; they knew well the invention of ventilation was an old affair, and had been in use for years previously both in this country and in America, and they practically refused to recognise such absurd pretensions. Among the foremost of these malcontents was Mr. Joseph Spokes, an extensive manufacturer, of the North-street Works, Fitzroy-square. He went on making ventilating safes as he had done previous to the appearance of this extraordinary patent, and he at once received the first volley of Kentish fire, and was put into Chancery forthwith. Some other rebellious spirits were promised a similar speedy attention. But the defendant in this case possessed the sinews of war, and was not to be so easily disposed of. He very properly resisted the unjust attack upon himself, and the equally unjust attempt thus to appropriate what was already public property.

The action proceeded; but after a vast amount of trouble and expense had been incurred, with all their attendant anxieties, in combatting with what may be considered a pure phantom, in battling inch by inch with an astounding ignorance of otherwise well-known facts, the truth became at length so clear, so palpable, so manifest even apparently to the plaintiff himself, that, acting under advice, he voluntarily withdrew from the action, which thereupon terminated. But the affair did not end here. It appears that shortly after the date of his patent the plaintiff had published a certain show card exhibiting, by aid of suitable wood-cuts, the various sizes, forms, and particulars of his safes. This card was headed with the words "Kent's Patent Ventilated Ice Safes," and was duly enrolled at Stationer's Hall. It appears also that Mr. Kent specially claims the word "Ventilated" as applied to his safes alone, on the same ground that the "Glenfield Starch Company" lay claim to the word "Glenfield;" and, further, that Mr. Spokes had the unheard-of temerity to use this same word upon *his* show cards. The consequence was that a second action was commenced against him for this second offence, and such action is now being vigorously prosecuted.

The case appears, therefore, to stand thus. Johnson, or some other lexicographer, invented a word and put it into his dictionary, and Kent claimed it. Rather a pleasing prospect this. We shall presently have all the words of the English language claimed by different tradesmen, and then what are we to do? The Printer, the Telegraphist, and the Postmaster-General will have to close their several establishments, except for exclusive purposes, and the world will come to a dead lock. But let us regard the matter in its strictly legal bearings. Novelty is here the indispensible element of protection at Stationers' Hall. It is the root, trunk, and branch of Mr. Kent's claim in the case now before us. Would it surprise him to find that there is not a particle of novelty about it even as applied to the qualification of ice safes? To say nothing of America, but to cite a special case at home, does the present claimant know the firm of Messrs. Whitford and Co., ice merchants of Liverpool, Manchester, and Grimsby? Evidently from his proceedings he knows nothing about these gentlemen, nor what they have previously done in connection with this matter. Would it surprise him to learn that for nine or ten years past at least they have constructed these ventilating ice safes, and have commonly used the word "ventilating" in their bills and advertisements. I have now before me two of their circulars, in both of which the fatal word occurs—once even in italics. One of these circulars is devoted to general directions, the other is printed in colours, and contains a beautiful view of Norwegian scenery, with appropriate accompaniments—the verge of a glacier, a group of pines, a frozen and broken foreground, a ship blocked up, a reindeer and sledge, &c., and in the distance the slaves of the "ventilating" principle collecting the ice. This card was printed at Hull, and issued to the public in 1860 or 1861. It is so well done that it positively chills one to look at it, an effect which may be safely predicted in a double sense for the present claimant. But in order to make assurance doubly sure, let him not depend upon my *ex parte* statement, but convince himself. Let him go into any news-room, and ask for a "Lincolnshire Directory" for 1863, published in 1862 by Morris and Co. At page 92, among the advertisements, he will see a veritable sketch of Messrs. Whitford and Co.'s Ventilating Ice Safes, with again the fatal word in full. What, now, therefore, becomes of this exclusive verbal property? What becomes of the celebrated entry at Stationers' Hall?

"Alas! poor ghost!"

How the present action is progressing I have no possible means of knowing, nor would it be competent to me to say if I did know. The parties may have filed some few bushels of affidavits, or they may not have done so. I know nothing whatever of their proceedings, I only trust that the present letter will show the utter and complete absurdity of the claim which is thus sought to be set up, and so be productive of good.

ISHAM BAGGS.

FOREIGN MINING AND METALLURGY.

The prices of most descriptions of metallurgical products are well sustained in the North of France, with the exception of puddled coke-made iron, which is quoted at 8*l.* 16s. to 9*l.* 12s. per ton. Rolled iron from charcoal-made pig, or pig of similar quality, has brought 10*l.* 12s. to 10*l.* 16s. per ton. In the Meurthe and the Moselle there has been great firmness in refining pig. In the Meurthe white pig is quoted at 2*l.* 16s. 10d. to 2*l.* 18s. 4d. per ton. In the Longwy group good white pig is sold at 3*l.* to 3*l.* 1s. 4d. per ton. The Villerupt Works, with their coke and charcoal furnaces, remain to France, and the same may be said of the St. Claire Works, which comprise three furnaces and refining apparatus. Since the annexation of Alsace and Lorraine there is no industrial establishment in the East of France devoted to the production of steel. MM. Dumont and Son, of Châtelineau (Belgium), have acquired some land at Maubeuge, for the establishment of a rolling mill for the production of plates; the direction of the new establishment will be entrusted to M. Gustave Dumont, jun.

The continental markets have been advancing, or have supported previous rates. At Paris, Chilian copper in bars has brought 71*l.* per ton; ditto in ingots, 77*l.*; and Corocoro mineral (pure standard), 74*l.* per ton. At Havre, Chilian in bars has made 71*l.* to 72*l.*; refined ditto in ingots, 77*l.* to 80*l.* per ton; Peruvian mineral (pure standard), 71*l.* to 72*l.* per ton; United States (Baltimore), 76*l.* to 78*l.* per ton; Mexican and La Plata in bars, 66*l.* to 68*l.*; old yellow copper, 40*l.* to 44*l.*; red ditto, 62*l.* to 66*l.* per ton. At Rotterdam, Drontheim has made 50 to 52 fls. At Rotterdam, Banca tin has been quoted at 80½ fls.; and Billiton, at 79½ fls. Amsterdam quotations are very similar. At Marseilles lead in saumons, first fusion, has made 17*l.* 10s.; ditto, second fusion, 17*l.* 4s.; ditto, argentiferous, 17*l.* 10s.; lead in shot, 20*l.* 8s.; and rolled and in pipes, 20*l.* per ton. At Paris, Silesian zinc, delivered at Havre, is quoted at 19*l.* 16s.; other good marks delivered at Havre, at 19*l.* 8s.; and ditto delivered at Paris, 19*l.* 16s. per ton.

There is not much change to report in the Belgian iron trade. In the Charleroi district No. 1 merchants' iron is quoted at 6*l.* 12s.; for special iron there has been a good demand as well on home as on foreign account. The works producing rails have all orders to execute, but several of them are looking out for new affairs to occupy them towards the close of the season. Producers of pig are much alarmed, and not without reason, at the news which reaches them from the Grand Duchy of Luxembourg, trucks for the conveyance of minerals making default almost entirely at present, with the probability that in a short time there will be none at all available. This is in consequence of the Treaty of Frankfort, which prohibits the Eastern of France Company from working the Guillaume-Luxembourg line. It is beginning to be urged that a measure which tends to the profit of Germany, but to the great detriment of Belgian national industry, calls for an energetic reclamation on the part of the Belgian Government. There appears a risk that while Belgium will receive scarcely any more of the Luxembourg minerals, the Rhenish and Alsacian works will be provided with them at reduced prices, and will be enabled, in consequence, to carry on a severe competition with Belgian metallurgists on the European markets. Advices from Liége state that there has been no change in the quotations for iron, and that orders for iron and plates are abundant, while prices are firm. A royal Belgian decree has granted to the Marcinelle and Couillet Company some valuable bearings of manganese in the communes of Lierneux, Vielsalm, and Arbre-Fontaine.

The report of the directors of the Cuidad Real and Badajoz Railway Company for the past year states that the demand for the coal of the Belmez Mines, to which the company has constructed a branch, has been slowly increasing in commercial account; the consumption appears to be still, however, inconsiderable. The line has been, in fact, a great failure thus far. The Kessales Colliery Company is now paying a dividend for the first half of 1871 at the rate of 1*l.* 4s. per share. The Belle-Vue Colliery Company, at St. Laurent (Liége), has also been paying a first dividend for 1871 at the rate of 16s. per share. The Carmaux Mines Company has been paying the balance of its dividend for 1870, or 1*l.* 4s. per share. The Loire Mines Company has been paying the balance of its dividend for 1870. The Haute-Loire Mines Company has been paying its dividend for 1870, or 1*l.* 8s. per share.

In the Charleroi basin the price of coal presents little variation, but is supported with firmness. Orders for coal are abundant this year, as well in the industrial centres as in the sugar-producing districts, which are anticipating extraordinary crops of beetroot. A general cry of distress makes itself heard with reference to the want of trucks upon the Northern of France Railway; the Charleroi Canal will also remain closed during the remainder of the present month. The great drawback to an otherwise generally satisfactory state of affairs is the inadequacy of means of transport. At Liége the market is in a good state, although quiet. There is rather more animation in the demand for coke on export account, but in the Liége district, as in the Charleroi group, there are great complaints as to the want of rolling stock. In the basin of the Couchant de Mons prices and wages remain without change; the state of affairs is quiet from the force of circumstances; trucks almost completely make default, as well as boats. Belgian coalowners are beginning to ask themselves whether it is not time that they should take the rolling-stock question into their own hands.

Great activity prevails in the coal basin of the Nord and the Pas-de-Calais, but the general want of means of transport continues to make itself felt in rather a deplorable manner. Prices are firm, with an upward tendency. Freights have been rather going down.

GOLD, AND THE GOLD FIELDS IN AUSTRALIA.—The improvement which has been noted for the past few months in the yield of gold obtained in the colony still continues. It is now generally believed that the gradual falling off in the returns of gold which has been recorded for some years past has been arrested, and there is every prospect in the future of an increase in the quantity of gold that will be found as compared with late returns. The most gratifying feature in connection with this industry in Victoria has been the gradual but at the same time important, progress and development of quartz mining in the Sandhurst district, where fresh discoveries are constantly reported of new quartz reefs, which promise to yield good returns for many years to come. The Sandhurst correspondent of the *Argus* says that the return of gold purchased for the past month is above the usual weekly average, and should the last week's have happened to have been included, the average would have come close up to 6000 ozs. a week. Several new companies have been formed during the week, and several are now pending, and these are of great magnitude in some instances, requiring a very heavy amount of cash to be paid down by our wealthier speculators, which it might be thought would have an influence on our market rather detrimental, so much capital being locked up; but at present there seems no signs of abatement in speculation.

There have not been any matters of special interest noted during the past month in regard to the Ballarat district, but the yields reported are up to the average of those obtained for some time past. Considerable interest has, however, been shown lately in the district with reference to several new theories as to the deposits of gold in that locality. The large companies of Ballarat, from whose claims most of the enormous quantities of gold returned by that district were got, have hitherto found the gold in deep ground, but a recent discovery of a valuable reef-wash in the Band and Albion Consols Company at a level nearer to the surface than their deep wash, led to the belief that there had been different deposits at various times, which had been covered over with inundations of volcanic lava, and it was concluded by many that the companies, in pushing downwards to their deepest ground, had most probably neglected what would be found yet to be profitable runs of gold. The discussion of this theory has led to the propagation of others by some of the gentlemen of Ballarat who, from their long experience, may be considered as best able to form opinions respecting gold deposits; and as public attention in Ballarat is now fully directed to the subject, some valuable results in the direction of the discovery of new layers of wash-dirt may, perhaps, be achieved. The most substantial proof of the present prosperity of gold mining is furnished by the export returns of Victorian gold, from which it appears that the quantity exported this year is in excess of that sent away to the corresponding date of last year to the amount of 117,237 ozs., representing in value nearly half a million of money. Up to the week ending May 10, the amount of Victorian gold exported was 861,825 ozs., whilst the amount to the corresponding week in 1870 was 544,588 ozs. A new digging was recently opened up at Stockyard Creek, Corner Inlet, near Wilson's Promontory, Gipps Land, the progress of which has been watched with interest in consequence of the locality being some distance from any other workable gold field. It was considered that if the digging proved remunerative there was every reasonable ground to believe that the country thereabouts, as well as that intervening between it and the other fields now being worked was auriferous, and, if so, a large area would be added to the already extensive gold-bearing districts of the colony. The latest report to hand is from the Corner Inlet correspondent of the *Gipps Land Times*, writing on June 5, and from it there can be no doubt that the new gold field will prove to be a permanent one.

As showing the waste of gold during the early days of quartz-crushing (see the *Gipps Land Mercury*), it has come to our knowledge that a party of men bought some 60,000 tons of quartz tailings at New Chum, and with the view of testing the value, sent home 16 tons of the pyrites as a sample. This mail's telegram has reached them *via* Galle with the pleasing intelligence that the yield is 4 ozs. 18 dwts. of gold, and 7 dwts. of silver per ton. Among the lucky speculators is one of the pioneers of the Stringer's Creek quartz mines.

The following anecdote respecting a valuable quartz mine now yielding large returns appeared in last week's *Australasian*:—"Amongst the fashionable companies of the Bendigo district is one known as Wilson and Co., Marong. Very lately Mr. Wilson sold this valuable claim to a proprietary company, and within a month of the purchase two large dividends have been declared. The history of this claim reads like a bit of romance. A weary and footsore traveller called one evening at a bush tavern. He asked for a bed, but, as he had no ready money, he was hospitably referred to airier lodgings in the bush at the back of the inn. That night he made his solitary camp, and fossicking about in the morning came upon indications which led on to the discovery of a valuable reef. This man was Wilson. Within a short time, from the produce of his claim, he bought out the inhospitable landlord; and after working his mining property profitably, Mr. Wilson has disposed of a portion of his interest, the property representing in the market, at current prices, about 20,000*l.*"

The average rate for miners in the Ballarat district is 2*l.* 5s. per week, eight hours shift; breaksman get a slightly higher rate of wages. In the Bendigo district, quartz miners in deep sinking, for pitwork, get 2*l.* 10s.; ordinary quartz miners get 7s. per day; engineers receive 3*l.* to 3*l.* 10s. In Bendigo, most of the work is done on tribute. In Alexandra, miners receive 2*l.* 10s. per week. Most of the work in Gipps Land is done by contract; where wages are paid, the men receive from 2*l.* 10s. to 3*l.*

Mr. Gideon S. Lang is about to proceed to England on behalf of the St. Arnaud Silver Mining Company, with the twofold purpose of endeavouring to raise some additional capital in the English market to aid in the development of the mine, and to engage a man who is thoroughly experienced in the treatment and reduction of silver ores. It appears that the company has a large quantity of ore which has had its silver partly extracted, but from the imperfection of the processes employed, due to the insufficient knowledge of those in charge, the quantity of silver got was much less than the ore was known to contain. Persons well acquainted with the silver mines of Nevada have inspected the workings, and spoken very highly of the prospects of the mine, and it is hoped that the results of Mr. Lang's visit will tend in a satisfactory manner towards aiding this undertaking to attain the success which has so long been waited for. [A correspondent draws attention to this matter in another column.]—*Melbourne Argus*, June 17.

MINING IN UTAH—WHAT ONE MINE IS DOING.—The Emma, par excellence the mine of Utah, is doing more at the present time than is generally known. It is turning out on an average 100 tons of ore per day, worth $135 per ton, over and above all expenses, making the handsome sum of $13,500 net profit for every 24 hours. This multiplied by 365 gives the astonishing product of $4,927,500 per annum! It requires a hundred hands to get this ore above ground, besides a large number that are employed in timbering the mine. We saw only a very few clerks at the office of the superintendent, and the great bulk of the work seems to be that of the pick and shovel. The hands are boarded by the company, at their works, and seem to be well provided for. The superintendent's residence, and the building in which the labourers eat and sleep, is not more than 50 ft. from the mouth of the tunnel. A spring of excellent water a short distance above the mine sends down a small stream, which has been conducted to the works, supplying abundance of water, which completes the numerous facilities that Nature seems to have thrown together for the benefit of the fortunate owners. A very good road has been made up the side of the mountain to the tunnel, the mouth of which, however, is but a few hundred feet above the level of the canyon. The teams hauling the ore are driven up to the works, where the metal in sacks is run down an incline into the wagons. It requires but a very few minutes to send down a load, and the whole work of filling and removing the ore seems to be done without the least hindrance or delay—a fact which certainly speaks well for the superintendent, Mr. J. E. Matthews. The fame of this extraordinary mine is attracting the attention of great numbers of the travelling public, who seem to feel that their visit to Salt Lake is but half complete without a sight of the Emma.—[Our Correspondent adds—"This is quite true: I have been through this mine."]

HEAVY MINING TRANSACTION.—We learn from reliable sources that the mines and furnace belonging to Messrs. Bateman and Buel, in Bingham canyon, have been reported on most favourably by Captain Nancarrow and Mr. Henry Sewell. Both these gentlemen are men of great practical experience, having been engaged in mining in South America, Mexico, and Europe. On the strength of their report, made after an exhaustive examination, the property was transferred on Saturday last to the hands of Captain Nancarrow, as representative of an English company, called the Utah Mining Company. The amount paid for this property is $450,000 coin. This is a large and important transaction for Utah. Our good wishes accompany both of these eminent scientific gentlemen in their career in this territory. They have triumphantly carried through the first mining operation in Utah on the boards of the London Stock Exchange, and called the attention of English capitalists to our valuable mines. We believe it may not prove the last.—*Salt Lake Daily Tribune*, July 18.

THE UTAH SILVER MINES.—Salt Lake City is now the head quarters for all mining operations in Utah, and is the rendezvous of capitalists who come to invest; miners who have "struck it," and come to "realise;" and of all who come to try their fortunes, seeking the ledges of precious ore among the crags and clefts of the rugged ranges which rise high and bold for 10[illegible] from the town. In addition to those active strangers, the city is visited by nearly all pleasure travellers over the trans-continental route, who find but much that is interesting in the Mormons. But the "Gentile" element is rapidly gaining strength, and will soon place Mormons and Mormonism in the background in Utah. To traverse the main street of Salt Lake City at noon-day would quickly give the impression that California, Montana, Nevada, and the whole mineral West had broken loose, and sent their stalwart and rollicking delegations here to take possession. The crowds of miners, speculators, &c., in the streets, the new stores full of goods, the new house-fronts and enlarged buildings, the assay and mining offices, the miners' outfitting stores, &c., all give the city the outward appearance of what it is really becoming—i. e., a great mining head quarters. Stages leave every morning for the Cottonwood, Bingham, Ophir, Tintic and other principal "districts," where deposits have been found so numerous and rich as to attract and engage large numbers of men, and to rapidly create new towns or mining camps. In Cottonwood, 26 miles from the city, numerous rich lodes have been opened—the principal one, the "Emma" mine, bidding fair to be one of the greatest silver mines in the world. The surprising extent of this great bed of ore is not yet known, although shafts and drifts have been sunk and run for hundreds of feet in various directions. Leaving Salt Lake to visit some of the mining districts, I reached Ophir City after a ride of ten hours in the stage. This place, although only six months old, has about 150 houses, including numerous well-built stores, two somewhat pretentive hotels, several restaurants and saloons, reduction works, and assay offices. The town is laid out, or rather strung out, in a narrow deep gorge of the Oquirrh range, called East Canon, and it is in and on these great rugged heights, rising sharply 2500 ft. on each side above it, that the many and extensive leads [illegible]

been found which have established here a busy mining district and built a magic city of the West" in this wild and romantic spot. The principal mines at present in this district are the "Silver Shield," "Velocipede," "Mountain Lion," and "Mountain Tiger." The first-mentioned two, situated high up on the north side of the canon, are working in an immense deposit of ore, the limit to which, as in the case of the "Emma," is not yet known. The other two are taking out quantities of very high grade rock, but have probably not so large a deposit as the first named. Besides these, there are numerous mines not much developed, but yet taking out fair amounts of good ore, which will pay the owners handsomely. There are also hundreds of locations or claims developing, many of which promise richly. One also finds in clambering about the mountains many abandoned claims, as in every mining district, where a few days or weeks had been employed without favourable result. At present the drawback to great activity here is the need of reduction works, smelters, stamp-mills, &c. There are now lying on the "dumps" of the various mines in this district alone thousands of tons of valuable ore, which cannot be worked here at present, and on account of the exorbitant freight charges on the Pacific Railroads can not be profitably shipped either East or West for treatment. The result is that many mines have to suspend work and wait. Meanwhile there is a great scarcity of money among the men, many of whom are almost penniless, and yet are possessors of valuable mines. There are, it is true, two small smelters here of a rated capacity of 30 tons per day; but as yet they have not worked regularly. There is also just completed an arastra, which works the ores on the old Mexican plan. Its capacity as yet is insignificent. Work is also just begun on the erection of three stamp-mills of 15 or 20 stamps each, which are to be completed within two months. Meantime the unworked ore is rapidly accumulating, and it will doubtless be several months before the real richness of the district can be known. It is somewhat surprising to note, in comparison with mining fevers of former days, how limited has been the excitement at a distance in regard to these developments in Utah. All men here from White Pine, and elsewhere in Nevada, agree in pronouncing the ledges and deposits of silver ore in Utah more numerous, rich, and permanent than those of any part of Nevada ever developed. There can be no doubt, however, that it will be best in the end that the development of all this mineral wealth should be slow, rather than accompanied by the wild speculation, "wild-catting," and swindling which have been associated with all gold and silver mining in the past.—Correspondence *N.Y. Tribune.*

U.S. MINING NEWS.—During the month of June dividends were paid as follows:—Chollar-Potosi, $2 per share, $56,000; Crown Point, $10, $120,000; Eureka (Cal.), $1, $20,000; Grenville (Cal.), $1, $4000; Natoma W. and M., 1 per cent., $3000; North Star (Cal.) $1 per share, $12,000; Raymond and Ely, $1, $30,000; Redington Quicksilver, $5, $6300; Yellow Jacket, $2·50, $60,000: total, $311,300.

At the Chollar-Potosi meeting, on July 10, the accounts showed that during the past year 84,681 tons of ore have been raised, against 56,636 tons raised during the previous year. The amount of ore milled during the year was 83,775 tons, and the value of bullion produced $3,444,023. Cash on hand, $200,721. Dividends paid, varying from $1 to $5 per share, foot up to a total for the year of $1,916,000. The report is a very flattering exhibit of the company, and looks extremely well for the management.

FOREIGN MINES.

SOUTH AURORA (Silver).—The directors have received, per steamer Nassa, bullion of the value of $5167·01 from their mines.

SIERRA BUTTES (Gold).—The following has been received by cable from the agents of the company in San Francisco:—Clean up for July, receipts $32,571; expenses, $16,070.

MALPASO (Gold).—The following is an extract of a letter just received from a gentleman in Colombia who has visited the auriferous gravel deposits situated in Tolima, recently acquired by the Malpaso Gold Washing Company:—"From what I have observed in California during a six years' residence in the mines of that country, and from practical experience of hydraulic mining, I feel assured that Malpaso can be worked so as to give a large and steady profit for generations to come. It has every advantage for sluicing on the largest scale, and has been proved already, as you know, by natives. It is hardly necessary to say that a powerful hydraulic machine would effect in one month, with eight men, what has hitherto been accomplished by natives in one year with 50 hands at work"

FERGUSON (Gold).—The directors have received a telegram from Mr. Inch, announcing that the company's mines have yielded for the month of July, being the first month of the co-operation, a profit of $1000 over the average expenses.

BIRDSEYE CREEK (Gold).—Mr. J. A. Stone, the manager, writes that he is making another run on the Uncle Sam claim previous to stopping work while the ditch was enlarged and repaired; when work was again resumed his expectations were that very much better results would be obtained. All operations were progressing in a very satisfactory manner.

SWEETLAND CREEK (Gold).—Mr. McLean sends his usual weekly diary. The work was going on exceedingly satisfactorily. The new tunnel was progressing well, now in 114 ft., and the rock favourable.

UTAH (Silver).—The directors have received letters from their manager, Capt. J. Nancarrow, in which he states that since he took possession he has thoroughly overhauled the present furnace, and put it in first-class condition, and would commence running the same about July 24. He had plenty of fuel ready stacked. The workmen were busily engaged erecting two new furnaces, and this would be pushed on with all speed. The mine was looking exceedingly well, and his opinion of its value was unchanged.

TOLIMA.—Extracts from a letter received by last mail from Mr. Welton, the vendor of the mines, communicating to his London agent the present state of the works at the Frias Mine, that being the silver mine of this company:—"Adit End on Pitt's Lode: The lode in the end is 2 ft. wide, with a splendid footwall. In the back stope the lode has improved in quality, consisting of blende, galena, pyrites, and native silver; the stope is being carried up to form a rise into Ceron's stope, thus ventilating the end and forming large stopes.—Pitt's Stopes: The lode still continues to go up good in the back stope, giving 18 in. of solid mineral in several parts. The drivage north contains a lode 3 ft. wide, with 8 in. of export ore; this is more satisfactory, as the further we drive north the greater the distance from the drive to the bunch below; and from this end containing good ore we may expect to have good stopes for a great distance above the bunch. The end north opens out both back and bottom stopes. The drive from the powder-house is progressing, and we may soon hope to see all the water brought back, and Pitt's bottom stopes on the bunch opened out. This drive contains a lode giving 12 in. of solid ore.—Spanish Powder-house Bottoms: I intend opening these stopes during the present month; the lode is 18 in. wide, composed of solid mineral. The cross-cut from the adit to cut this lode will also be commenced. The cross-cut to intersect Powle's lode has been driving during this month; cut one branch 3 in., being solid ore.—Spanish Bottom, No. 2 Stope: A sink is being sunk on the bottoms of these workings to open out more bottom stopes, and gives 11 in. of export ore. The drive north, on the same lode, is 3 ft. wide, composed of quartz, pyrites, and soft rich galena, with much native silver. We are now getting good back stopes at this point. I shall continue the drive south on this lode, under the main Pump, as the bottom of the 10, under the Pump, is rich stoping ground. The returns for the dast month are worth $500 per ton, obtained principally from Pitt's back stopes, the greater part of the miners having been employed opening out ground and on cross-cuts."

PACIFIC.—The directors have received the following telegram from Mr. Henry Sewell, their superintendent at Austin:—"Received yours and Chairman's letters July 20. Mettacom Mill will run with new revolving furnace in three weeks; particulars letter 3d present; bars promised, 20th present; Pridmux has cut another ledge in north cross-cut, in virgin ground, worth $500 per fathom—$200 per ton; mine looking rich."

PINTO (Silver).—John E. Plater, Nevada, July 17: The mines of the company are generally looking well, and we are driving the tunnel at the rate of 3 feet every 24 hours, having now accomplished 80 feet from the point of opening. The ledge in the Mountain Chief widens as we get deeper, and promises to produce well, although we are raising little ore at present, and shall be for some days to come, on account of dead work necessary to make connections for air. The Michigan shows some fine ore, the quantity at present not large. The new ledge discovered in grading for the whim improves as we sink, and we have produced 5 tons of ore, assaying $50 in silver, and 60 per cent. lead. The formation and general appearance of the ground lead me to suppose this is the outcrop of a body of ore existing in the Maryland incline, about 40 ft. from the surface; and if I am correct, the product from this point alone must be very important. The ore in the bottom of the Maryland shaft continues good, but the expense of rai-ing is considerable, and for the present at least I think it well to take out only such as necessity compels in sinking, as, when the tunnel shall have been completed, the only cost of producing will be the actual mining. The contractors for the mill are making good progress; and from the energy they already show, I am inclined to think they hope to advance the time of completion a month at least before the period allowed by the contract.

BATTLE MOUNTAIN.—Captain Richards, July 20: Virgin: In the 33 stopes, south of Roach's winze, the lode produces ore of lower quality than heretofore, and which requires much careful assorting, and is worth less per ton. In Jury's rise, in the back of the 73 north, the lode is poor; a communication has been effected herein with the 37, and improved ventilation in consequence. Since holing the above the 73 end north has been resumed; the lode is of a very promising character, and produces occasional good stones of grey ore and spots of red oxide. In the 37 feet level north the lode, although regular, and spotted with green carbonate of copper, is of no value, and the men have been placed to put a stope over the back to prove if the lode contains a sufficient quantity to pay for stoping. Ore raised during the week, 120 sacks.

LINARES.—Aug. 2: Pozo Ancho Mine: The lode in the 85, west of Crosby's engine-shaft, is small, compact, and very regular, yielding 1 ton per fathom. In the 75, of the same, the level is opening tribute ground, at present yielding 1 ton per fathom. In the 75, west of San Francisco, the lode is small and poor. The lode in the 75, east of the same, is not so productive as it was, yielding 1½ ton per fathom. In the 65, west of the same, the lode is diminishing in size, yielding ¾ ton per fathom. The lode in the 55, of the same, is small and poor. In the 45, east of the above, the lode continues unproductive.—Shafts and Winzes: No. 175 winze, below the 65, has reached the 75, and the men are set to drive west from the bottom of it, producing 1 ton per fathom. The stopes produced the full complement of mineral in the past month, without undergoing any unusual alteration. The machinery is in good condition, and the surface works are going on very regularly. We estimate the raising for August at 200 tons.—Quintentos Mine: The lode in the 65, east of Taylor's engine-shaft, is small and unsettled at present. In the 65, west of the same, the ground is very hard for driving. The 55, of the above, will soon get under the part of the 45 where there is a great length of rich lode. The lode in the 55, east of the same, is large and strong, with good lumps of ore. The lode in the 45, east of Addis's, same, the lode is disarranged at present, and is chiefly formed of decomposed granite. The lode in the 32, west of Henty's, has fallen off in value. In the 32, west of the same, the lode is improving in appearance. There is no change in the 32, west of San Carlos, worthy of notice. In the 45, of the same, the ground is moderately easy for driving, but the lode continues small. The 45, east of the Shafts and Winzes: In San Carlos, below the 45, the men are getting on very well with this hard shaft. In Judd's, below the surface, the men are making good progress, and we hope to communicate with the 32 shortly. The lode in Granero's winze, below the 32, contains good stones of ore, but not sufficient to attach a value to. In Martin's, below the 32, the lode is very changeable, and is not now so good as it was, yielding 1 ton per fathom. The lode in Salvador's winze, below the 32, is rather small.

FORTUNA.—Aug. 2: Canada Incosa: In the 120, east of O'Shea's shaft, the men are cross-cutting to winze, which we find is sunk on another part of the lode. The men are still engaged in cutting plat and stoping some ground in the bottom or the 110, west of Henty's. The lode in the 110 of the same is still compact and regular, yielding 1¼ ton per fathom. No change to notice has taken place in the 80 south of the above. The lode in the 60, west of San Pedro's, looks kindly, and the ground easy for driving, yielding 2 tons per fm. In the 60, east of same, lode rather small and ground hard, yielding 1½ ton per fm. The lode in the 90, east of Addis's, is looking much better in this end than for some time past, yielding ¾ ton per fathom. The 80, east of Lowndes', is opening out fairly productive ground, yielding 1½ ton per fathom. The lode in the 80, west of the same, is still unproductive.—Shafts and Winzes: In Carro's shaft, below the 70, the ground being much harder than expected, we have not made such progress as we anticipated towards holing. We expect to hole Dolores' winze, below the 50, to the 60 very shortly, yielding ⅛ ton per fathom. The lode in Pedro's, below the 50, is large and promising, yielding ¾ ton per fm.—Los Salidos Mine: The lode in the 110, east of Buenos Amigos, is small but regular, and the ground hard for driving, yielding ⅛ ton per fathom. In the 110, west of the same, the lode is kindly, composed of carbonate of lime and lead ore, yielding 1 ton per fathom. This end of the 100, of the same, is without change since last report, yielding 2 tons per fathom. The lode in the 90, west of San Carlos, is chiefly composed of quartz, clay, and lead ore, yielding 1½ ton per fathom. The 75 of the same is now quite unproductive. No change has taken place in the 110 east of Morris's engine-shaft. The lode in the 100, east of Cox's, is small at present, but we expect it will improve again shortly, yielding ⅜ ton per fathom. The 25, west of Palgrave's, is letting out a large quantity of water, and the ground is somewhat easier for driving, yielding 1 ton per fathom. The end of the 25, east of the same, being poor, is suspended for the present, and the men put to sink a small shaft for ventilation and footway.—Shafts and Winzes: In Palgrave's engine-shaft, below the 25, the men are making fair progress. The lode in San Miguel, below the 75, which was in the south side, is now in the shaft, which has made it easier for sinking, yielding 2⅛ tons per fathom. In San Pablos, below the 90, the lode is not so solid and productive as it was, yielding 1 ton per fathom. Pedro's winze, below the 90, is completed to the 100, and yielding 6 tons per fathom. Carlos' winze, below the 75, is holed to the 90 with a former hole, and will be completed in a few days, yielding 1¼ ton per fathom. The lode in Jorge's, below the 90, is regular and compact, and the ground very hard for sinking, yielding 1½ ton per fm.

RHINE (Rhenish Prussia).—Aug. 8: Schmelzer: Henty's shaft was sunk in July 2 fms. The shaft is now going through the Loin lode, which yields good stones of copper pyrites, but not sufficient to value; the lode itself has a more settled and healthy appearance than in the 17 fm. level, and gives promise of yielding ore in paying quantities deeper. The shaft at the end of the month was 5 fms. 4 ft. below the 17; 4 fms. 5 ft. remained to be sunk.—Schmelzer Lode: The level going north-west was driven last month about 3½ fms.; the ground has improved for driving; the lode has not materially changed. Bleibtren's shaft has been cleared 10 fms., and the bottom will soon be reached. At 8 lachters deep a cross-cut was, we find, driven about 3 fms. to the Schmelzer lode, which has been driven upon a great many fathoms. A considerable quantity of ground has been stoped away, thus showing that the former workers found ore enough to justify such a course. The old levels are broken in in many places. I shall be able to give you further notes on this subject when the shaft is cleared and the ground dialled. Marienfreude south shaft is being sunk at a moderate speed, by six men; the lode, which is in the shaft, and is almost vertical, is increasing in size and improving in appearance, giving out more water, and yielding occasionally good stones of lead ore; the lode justifies a fair trial.

ALAMILLOS.—The lode in the 60, west of San Rafael, is strong and regular, but quite unproductive. In the 50, west of San Martin, the lode continuing unproductive we have suspended the driving for the present. The lode in the 50, east of La Magdalena, is small, and the ground very hard. In the 75, east of Taylor's engine-shaft, the lode is large and strong, and of a very promising appearance, yielding 1 ton per fathom. The lode in the 50, west of San Yago, is letting out more water than usual, which is a good indication. The 30, east of San Victor, has opened a good length of valuable ore ground in the past month, yielding 2 tons per fm. The lode in the 20, east of Addis's, is unproductive at present. In the end of the 20, west of the same, the lode has improved in the past week, yielding 1 ton per fathom. In the 40, east of Crosby's shaft, the ground is rather hard for driving. The lode in the 40, west of Crosby's cross-cut, is compact and firm, and opening tribute ground, yielding 1¼ ton per fathom. In the 50, east of Crosby's shaft, the driving is resumed, and the lode letting out water freely. The lode in the 30, east of Henty's, although larger than usual, is not so productive as it was, yielding 1 ton per fm. There is no improvement in the 20, east of Swaffield's, at this point.—Shafts and Winzes: At San Victor's shaft, below the 40, the men have worked well in the past month. The ground in San Adrianos, below the 60, is very hard for sinking. Serrano's winze, below the 50, is holed to the 65, yielding ⅛ ton per fm. The lode in Jaen's winze, below the 40, is diminishing in both size and value in this sink, yielding 1 ton per fm. The lode in Henty's, below the 20, is less productive than it was, yielding ⅛ ton per fathom. The tribute department is, on the whole, looking much as usual. The machinery is in very good working order, and the surface operations are proceeding very regularly. We estimate the raisings for August at 225 tons.

CAPE (Copper).—The reports of Spectakel, Koperberg, and Springbok, are received. The two first show no material alteration since the last reports. Of Springbok Capt. Williams writes: "The winze sinking below the 10 fm. level during the past month has been sunk 2 fms. 5 in., the first 3 feet yielding about the rate of 3 tons of copper ore per fathom; we then met with a hard floor of quartz, which cut the ore out for about 3 feet deep, since that it has been gradually improving for the last 6 feet, and will now yield about 1 ton of very rich ore per fathom, and looking very promising for further improvement. Transport to 23d June—To Port Nolloth, 330 tons of ore, 28 tons metal, and 92 tons regulus; to Hondekilp, 32 tons of ore.

WEST CANADA.—Wellington: At Rowe's shaft, sinking below the 40 fathom level, the men having sunk the 3 feet to complete the depth for new stopes are now preparing to put down the lift. The stope below the 30 fathom level, east of Rowe's shaft, will yield at present about 2¾ tons per fathom. In the stope below the 30 fathom level, west of Rowe's shaft, the ground is nearly taken away; the lode will yield 2¼ tons per fathom.—Huron Copper Bay: In the 60 fm. level, east of Bray's shaft, the lode in the end continues large and promising, and will yield 2½ tons per fathom. In the 50 fathom level, west of Palmer's shaft, the lode is hard and unkindly, containing a little ore, and will yield ¼ ton per fathom. In the 35 fm. level, west of Bray's shaft, on Fire lode, the lode is larger and more productive than when last reported on; at present it is worth 2 tons per fathom. The following stopes are without much alteration:—The stope in the bottom of the 5½, west of Palmer's shaft, will yield 2¼ tons per fathom. The stope in the back of the 50, east of Palmer's shaft, will yield 3 tons per fathom. The stope in the back of the 50, east of Bray's shaft, will yield 2 tons per fathom. The stope in the back of the 35, west of Palmer's shaft, will yield 3 tons per fathom. The stope in the bottom of the 35, east of Bray's shaft, will yield 2½ tons per fathom. The stope in the bottom of the 35, east of Bray's shaft, will yield 3 tons per fathom.

[For remainder of Foreign Mines see to-day's Journal.]

AUSTRALIAN MINES.

YUDANAMUTANA (Copper).—The superintendent states, under date June 19—"The main shaft is down nearly 40 fms., and the ground easier. My letters of April 24 and May 20 will have shown you to what extent I have been compelled to draw (3000*l.* and 1000*l.*), and I fully rely upon your accepting and returning these drafts at maturity, as it rests with you to protect your own and best interests by keeping us from anything like suspension for the next few months; this can only be done by your honouring with promptitude the drafts which have been sent forward. The draft for 1185*l.* will not be sent this mail." Capt. Terrell reports under date of June 12—"Blinman Mine: The Stopes: There are no alterations in the stopes since my last report. We have been enabled to get sufficient ore to keep two furnaces going, but owing to the short supply of dry wood I had not two going for the whole of the month. The mine throughout is just the same as when last reported, and I do not think there be any difference in it before we are down upon Hill's lode, which I expect to report, should the ground hold as favourable as at present, by the end of July. The machinery is nearly all fixed in the engine-house, and we are now bedding the boilers, and the directors may rest assured that I will push on the shaft, so that the engine will not remain long idle after it is finished. Copper raised and smelted, 176 tons; copper made, 14 tons 10 cwts. We have been favoured with some very nice rains, making the country look well, and giving every prospect of another good season."

PORT PHILLIP AND COLONIAL (Gold).—The quantity of quartz crushed for the four weeks ended May 24 was 5355 tons; pyrites treated, 38 tons; total gold obtained, 1466 ozs., or an average per ton of 5 dwts. 11⅛ grs.; receipts, 5538*l.*; payments, 4223*l.*; profit, 1315*l.*, added to which was last month's balance of 594*l.*, making an available balance of 1909*l.* The amount divided between the two companies was 1200*l.*, the Port Phillip Company's proportion of which is 780*l.* The balance of 709*l.* was carried forward. The return for the two weeks ended June 7 is as follows:—Quartz crushed, 2452 tons; pyrites treated, 28 tons; total gold obtained, 756 ozs., or an average per ton of 6 dwts. 4 grs.; remittance, 700*l.* The company have by telegram the following additional advices:—Month ended June 21—yield per ton, 5 dwts. 6 grs. Two weeks ended July 5, 5 dwts. 8 grs. per ton; remittance, 700*l.*

ENGLISH AND AUSTRALIAN (Copper).—The quantity of coal at Port Adelaide was about 1154 tons. There were three smelting and three roasting furnaces and one refinery at work at Port Adelaide. Since date of last advices about 250 tons copper had been shipped, inclusive of the 190 tons advised by last mail as ready for shipment.

SCOTTISH AUSTRALIAN.—The sales of coal from the Lambton Colliery for the month of May amounted to 9751 tons. The superintendent reports that matters at the colliery were progressing favourably.

YORKE PENINSULA.—The directors have advices, dated June 14, with reports from the Kurilla Mine to the 16th. Capt. Anthony reports:—Hall's Shaft: The 45 is driven 4 fms. east of the shaft, on the south wall.—Deebie's Shaft: The 25 fm. level west is driven from 16 to 17 fathoms west of shaft.

ANGLO-AUSTRALIAN (Gold).—The directors have advices from Mr. Kitto, dated Fryerstown, June 17, who writes—"The pumps are not yet at work, in consequence of the double connection necessary to work both shafts at once not being supplied by the foundry until two days ago. A great impetus has been given to quartz mining in the colony lately, arising from recent development in deep ground at Sandhurst and other parts of the colony. This has caused the foundries to be full of work. So soon as the water is pumped from the western shaft I think I will open out on the leader from which we obtained the prospects, and further develope it."

LONDON GENERAL OMNIBUS COMPANY.—The traffic receipts for the week ending August 6 were 12,006*l.* 1s. 10d.

COAL TRADE.—Mr. J. R. Scott, the Registrar of the London Coal Market, has published the following statistics of imports and exports of coal into and from the port and district of London by sea, railway, and canal during July, 1871:—

By Sea.	Ships.	Tons.
Newcastle	170	97,782
Seaham	30	10,031
Sunderland	75	45,287
Middlesborough	12	4,934
Hartlepool	79	28,392
Scotch	17	4,080
Welsh	3	842
Yorkshire	27	2,717
Small coal	—	—
Cinders	7	1,274
Total	420	192,319
Imports in July, 1870	453	209,447

By Railway and Canal.	Tons cwt.
London and North-Western	63,646 11
Great Northern	77,541 0
Great Western	27,577 0
Midland	113,603 0
Great Eastern	34,964 16
South-Western	2,294 12
London, Chatham, & Dover	1,130 0
South-Eastern	806 7
Grand Junction Canal	459 5
Brighton and South Coast	2 5
Total	341,115 16
Imports in July, 1870	240,639 0

COMPARATIVE STATEMENT, 1870 AND 1871.

By Sea.	Ships.	Tons.
Jan. 1 to July 31, 1871	3798	1,701,958
Jan. 1 to July 31, 1870	3357	1,573,755
Decrease in pres. year	441	130,203

By Railway and Canal.	Tons. cwts.
Jan. 1 to July 31, 1871	2,534,028 15
Jan. 1 to July 31, 1870	2,104,003 9
Increase in present year	430,025 6

THE TIN TRADE.—Mr. L. Th. van Houten (Rotterdam, July 31) writes—A strong feeling prevailed in the Tin Market this month, and with very little offering a further advance of prices has been established. Banca has been in active demand, and with a limited supply the price improved from 79 fl. to 80½ fl. Ex the Autumn sale some transactions at 77 fl. to 78½ fl. took place. Billiton has been in good request, but, in consequence of the reduced stock, only a limited business is reported at 77 fl. to 79½ fl. Some floating parcels changed hands at 77 fl. to 79 fl., according to the date of sailing. The position of Banca tin in Holland on July 31, according to the Official Returns of the Dutch Trading Company, was—

	1871.	1870.	1869.
Import in July—Slabs	6,833	9,456	3,935
Total seven months	73,547	123,933	44,449
Deliveries in July	12,400	7,230	7,322
Total seven months	99,819	80,746	56,273
Stock second-hand	51,842	58,965	89,247
Total stock	122,626	166,840	129,449
Stock of Billiton	3,924	2,998	6,914
Import in July	1,273	3,300	—
Delivered and shipped in July	3,500	4,475	900
Quotation { Banca	80½ fl.	71 fl.	79½ fl.
July 31 .. { Billiton	79½	69	77½

These returns compared with those of 1870, exhibit—A decrease of the import for July of 82 tons, a decrease of the import for the seven months of 1575 tons, an increase of the deliveries for July of 161 tons, an increase of the deliveries for the seven months of 597 tons, a decrease of the stock second-hand of 229 tons, a decrease of the unsold stock of 1159 tons, a decrease of the total stock of 1382 tons, and an advance of the quotation of Banca of 9½ fl., equal to 15*l.* 8s. 4d. per ton. The quantity of Banca tin now afloat for the Dutch Trading Company is 16,100 pecuis, equal to 1006 tons, against 13,900 pecuis, equal to 869 tons last year. We estimate the quantity of Billiton tin now afloat at 8808 pecuis, equal to 550 tons, against 6228 pecuis, equal to 389 tons last year. The Government returns for the month of May are as follows:—

EXPORT OF TIN FROM HOLLAND.

	May.			Five months.		
	1871.	1870.	1869.	1871.	1870.	1869.
Germany ..Tons	277	152	100	1251	903	780
England	183	291	21	698	602	234
Belgium / France	131	108	91	491	1029	758
Hamburg	15	16	2	87	48	43
United States	—	—	—	—	19	18
Other countries	89	51	—	151	81	81
Total ..Tons	686	617	214	2678	2702	1914

COPPER ORES.

Sampled July 19, and sold at Swansea, August 8.

Mines.	Tons.	Produce.	Price.
Knockmahon	101	11⅜	£7 9 0
ditto	97	11½	7 10 0
ditto	104	3⅞	2 4 0
ditto	81	10	6 10 0
ditto	130	7½	4 15 0
ditto	76	4	2 5 0
Berehaven	80	7⅞	5 1 0
ditto	126	7⅞	5 3 0
ditto	74	8½	5 3 6
ditto	92	8	5 2 6
ditto	95	7⅞	5 1 6
ditto	52	8	5 0 0
Paramatta	50	17¼	11 11 0
ditto	50	17¼	11 9 0
ditto	50	17¼	11 9 6
Brass Ashes	65	5⅜	2 14 6
Brass Ashes	44	5	£2 9 6
Lisbon Ore	47	24½	16 12 0
ditto	45	24½	16 12 0
Telhadella	18	14	9 2 0
ditto	16	14¾	9 9 6
ditto	3	26½	17 10 0
London Ore	24	13¼	8 16 0
Mixture	23	4⅞	2 3 0
Copper Prec.	8	41	27 2 6
Copper Slag	22	6¼	2 13 6
Copper Reg.	5	49¾	32 8 6
ditto	5	24½	15 14 6
Sweepings	3	2⅞	1 0 0
C. Ore H. L.	6	15⅝	9 17 0
„ fine	1	26¾	17 15 0

TOTAL PRODUCE.

Knockmahon	589	£3023	15 0	Mixture	23	£ 49 9 0
Berehaven	519	2349	9 6	Copper Precipitate	8	217 0 0
Paramatta	150	1723	15 0	Copper Slag	22	58 17 0
Brass Ashes	109	286	0 6	Copper Regulus	10	240 15 0
Lisbon Ore	92	1527	4 0	Sweepings	3	3 0 0
Telhadella	37	367	18 0	C. Ore H. L. & fine	7	76 17 0
London Ore	24	211	4 0			

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Names.	Tons.	Amount.
Copper Miners' Company	35	£ 474 5 0
P. Grenfell and Sons	176	1222 13 0
Sims, Willyams, and Co.	53	325 6 6
Vivian and Sons	726	4517 6 0
Williams, Foster, and Co.	293	1254 1 0
Mason and Elkington	126	642 19 0
Sweetland, Tuttle, and Co.	184	1998 14 0
Total	1593	£10,435 4 0

NO SALE on August 29.

TOTALS AND AVERAGES.

21 cwts.	Produce.	Price.	Per unit.	Standard.
Whole sale	1592	10⅛	£6 11 0	12s. 11d.	£ 86 18 0

COPPER ORES.

Sampled July 19, and sold at Tabb's Hotel, Redruth, Aug. 3.

Mines.	Tons.	Price.
West Tolgus	100	£3 14 0
ditto	86	3 16 0
ditto	83	3 15 0
ditto	73	3 15 6
ditto	50	3 2 6
ditto	22	1 15 6
Crenver & Abraham	83	3 4 6
ditto	75	7 5 6
ditto	72	6 2 6
ditto	64	2 18 6
ditto	46	6 2 6
ditto	36	5 18 6
ditto	8	4 1 0
West Seton	62	6 15 0
ditto	61	3 10 0
ditto	60	2 10 6
ditto	58	6 12 6
ditto	49	2 12 0
ditto	47	7 18 6
North Treskerby	92	5 5 6
ditto	61	5 2 6
ditto	58	5 2 6
ditto	54	4 0 6
ditto	45	3 16 6
East Grenville	75	2 9 6
East Grenville	71	£1 17 0
ditto	61	5 9 6
ditto	59	1 18 6
ditto	31	4 16 0
ditto	9	1 7 0
Wheal Seton	35	4 0 6
Pendarves	54	0 14 0
ditto	50	5 0 6
ditto	47	4 2 6
ditto	42	1 1 6
ditto	36	3 18 6
South Crofty	47	1 19 6
ditto	45	2 12 6
ditto	39	2 12 6
ditto	25	2 5 6
ditto	9	10 6 0
East Pool	87	2 11 0
ditto	23	3 3 0
Wheal Basset	37	5 1 6
ditto	26	4 10 6
North Downs	42	4 1 6
ditto	21	3 6 6
Pennance	10	4 18 6
Emily Henrietta	7	3 16 6

TOTAL PRODUCE.

West Tolgus	414	£1478	18 6	South Crofty	165	£ 462 18 0
Crenver & Abra	384	1964	19 0	East Pool	110	294 6 0
West Seton	347	1667	12 6	Wheal Basset	63	305 8 6
North Treskerby	310	1484	13 0	North Downs	63	240 19 6
East Grenville	306	925	9 6	Pennance	10	49 5 0
Wheal Seton, &c.	264	810	5 0	Emily Henrietta	7	26 15 6

Average standard £100 1 0 | Average produce 6¾
Average price per ton £4 0 0
Quantity of ore 2433 tons | Quantity of fine copper 163 tons 17 cwts.
Amount of money £9715 10 0
LAST SALE.—Average standard £100 14 0—Average produce 6⅞
Standard of corresponding sale last month, £101 0 0—Produce, 6¼.

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Names.	Tons.	Amount.
Vivian and Sons	331	£1864 3 9
Grenfell and Sons	451	2074 12 0
Sims, Willyams, and Co.	107	537 13 6
Williams, Foster, and Co.	388½	1826 12 3
Mason and Elkington	370½	1491 19 0
Copper Miners' Company	397½	726 18 0
Charles Lambert	110	294 6 9
Sweetland, Tuttle, and Co.	237½	898 5 6
Total	2433	£9715 10 0

NO SALE on Thursday last, August 10.

Copper Ores for sale at the Royal Hotel, Truro, on Thursday next—Mines and Parcels.—Devon Great Consols 1387—Marke Valley 554—South Caradon 803—Glasgow Caradon 240—Gawton Copper Mine 237—Phœnix 207—East Caradon 185—Wheal Russell 175—Bedford United 155—Hingston Down 146—Wheal Crebor 93—Gonamena 87—Craddock Moor 80—Prince of Wales 60—Belstone 16—Pearce and Co.'s Ores 14.—Total, 4118 tons.

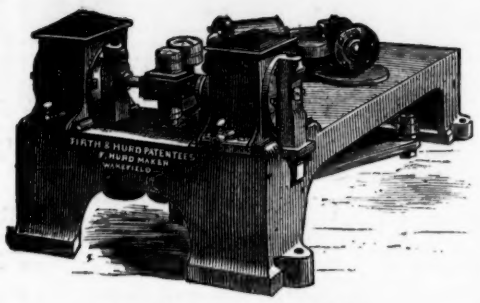
F. HURD, ENGINEER,

MILLWRIGHT, MACHINIST,

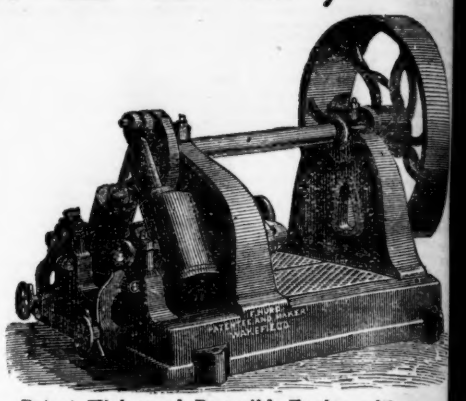
BRASS AND IRON FOUNDER,

ALBION FOUNDRY,

WAKEFIELD.



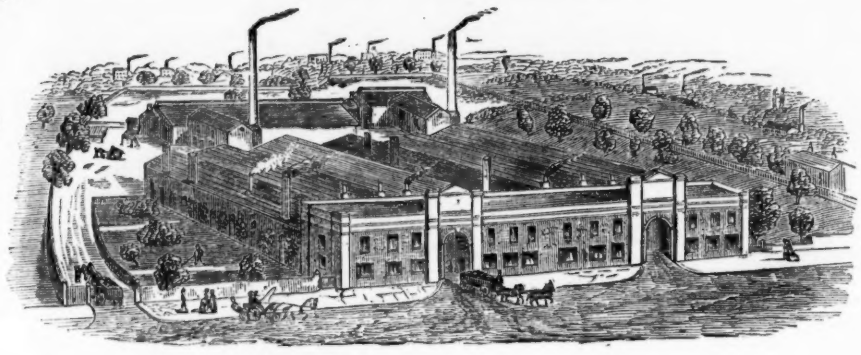
Patent Air-Compressing Engine.



Patent High-speed Reversible Engine, without the aid of Tappets, Cams, or Eccentrics. Cylinders either fixed or oscillating.

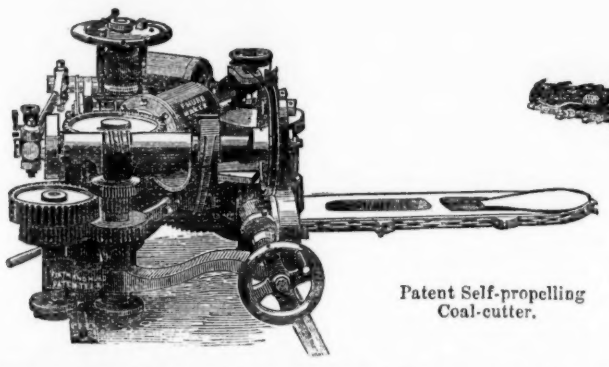
MANUFACTURER
Of PATENT MINING and EXCAVATING MACHINERY.

FIRTH'S PATENT CANNEL HUB DRESSER.

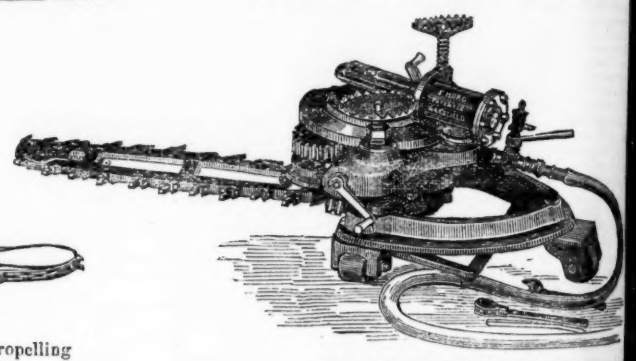


HYDRAULIC and AIR-COMPRESSING MACHINERY. Heavy, Light and Ornamental CASTINGS and Patent WORSTED MACHINERY.

Patent Power, or Hand Straight Work Coal-Cutting Machine.



Patent Self-propelling Coal-cutter.



Patent Power Pillar-and-Stall Work Coal-Cutting Machine.

Also, FIRTH'S PATENT ECONOMIC PERMANENT RAILWAY, without the aid of Pins, Bolts, or Wedges, that can be laid by an ordinary labourer with rapidity.

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BLAKE'S PATENT STONE BREAKER,

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FOR REDUCING TO SMALL FRAGMENTS ROCKS, ORES, AND MINERALS OF EVERY KIND.

This is the only machine that has proved a success. This machine was shown in full operation at the Royal Agricult ural Society's Show at Manchester, and at the Highland Agricultural Society's Show at Edinburgh, where it broke 1½ ton of the hardest trap or winstone in eight minutes, and was AWARDED TWO FIRST-CLASS SILVER MEDALS.
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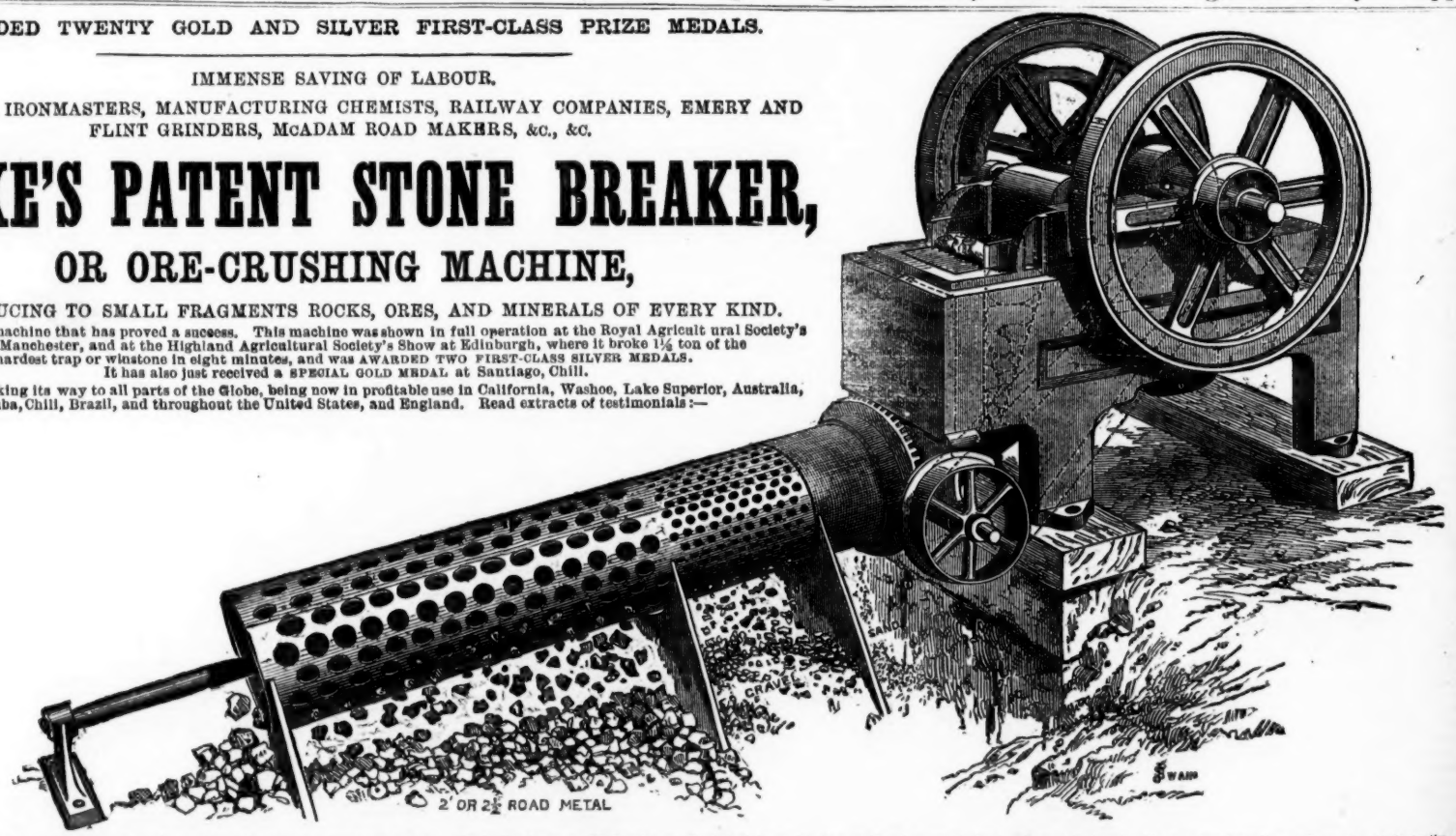
It is rapidly making its way to all parts of the Globe, being now in profitable use in California, Washoe, Lake Superior, Australia, Cuba, Chili, Brazil, and throughout the United States, and England. Read extracts of testimonials:—



The Parys Mines Company, Parys Mines, near Bangor, June 6.—We have had one of your stone breakers in use during the last 12 months, and Capt. Morcom reports most favourably as to its capabilities of crushing the materials to the required size, and its great economy in doing away with manual labour.
For the Parys Mining Company.
H. R. Marsden, Esq. — JAMES WILLIAMS.

Ecton Emery Works, Manchester.—We have used Blake's patent stone breaker made by you for the last 12 months, crushing emery, &c., and it has given every satisfaction. Some time after starting the machine a piece of the moveable jaws about 20 lbs. weight, chilled cast-iron, broke off, and was crushed in the jaws of the machine to the size fixed for crushing the emery.
H. R. Marsden, Esq. — THOS. GOLDSWORTHY & SONS.

Alkali Works, near Wednesbury.—I at first thought the outlay too much for so simple an article, but now think it money well spent. WILLIAM HUNT.

Welsh Gold Mining Company, Dolgelly.—The stone breaker does its work admirably, crushing the hardest stone and quartz. WM. DANIEL.

Our 15 by 7 in. machine has broken 4 tons of hard winstone in 20 minutes, for fine road metal, free from dust. Messrs. ORD and MADDISON,
Stone and Lime Merchants, Darlington.

Kirkless Hall, near Wigan.—Each of my machines breaks from 100 to 120 tons of limestone or ore per day (10 hours), at a saving of 4d. per ton.
JOHN LANCASTER.

Ovoca, Ireland.—My crusher does its work most satisfactorily. It will 10 tons of the hardest copper ore stone per hour. WM. G. ROBER

General Frémont's Mines, California.—The 15 by 7 in. machine effects a s of the labour of about 30 men, or $75 per day. The high estimation in we hold your invention is shown by the fact that Mr. Park has just orde third machine for this estate. SILAS WILLIA

Your stone breaker gives us great satisfaction. We have broken 101 t Spanish pyrites with it in seven hours. EDWARD AARO
H. R. Marsden, Esq. Weston, near Runco

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